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The Vegetation and Plants of Niah National Park, Borneo

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Abstract

Based on survey work and specimen collection carried out during 2001 to 2003, vegetation types that occur in Niah National Park (the various facies of limestone vegetation–the Subis limestone is the most prominent feature of the Park–mixed dipterocarp forest, seasonal swamp forest on clayey marls and on peat soils, riparian forest, and regenerating forest developing after shifting cultivation) are described. A provisional checklist of species includes more than 300 species. Ferns, Acanthaceae, Annonaceae, Araceae, Begoniaceae, Euphorbiaceae, Gesneriaceae, Moraceae, Rubiaceae and Urticaceae are well represented, while orchids and palms appear to be under-collected. A number of fruit tree species and other useful plants occur in the Park. The Park is home to at least 12 endemics found nowhere else, and 5 possible new species.

Introduction

The following account of the plants of Niah National Park (Niah NP) grew out of work done to map and describe the vegetation types at Niah NP under the Sarawak Forest Department/DANIDA Project *Support to Wild Life Master Plan Implementation through the Improved Management of Totally Protected Areas, Sarawak, Malaysia* (SWMPI) completed in 2003. An understanding of the Park's vegetation and flora is, of course, a *sine qua non* for effective park management.

Niah NP lies close to the north coast of Sarawak in the lower reaches of Sungai (Sg) Niah catchment. The Park's most prominent feature, located almost entirely within the Park, is the striking Subis limestone massif (the remains of an ancient coral reef), which rises vertically out of the Sg Niah floodplain. The Park area has a unique history of human interaction dating from prehistoric times to the present. Constituted in 1974 (with the inclusion of the Niah Great Cave and Historical Monument in 1994), Niah NP covers 3,139 ha. Local people formerly farmed and planted fruit trees in the area and some local inhabitants have been accorded a range of gazetted rights within the Park, such as the right to collect fruit and forest products.

Although the first plant collections were made at Subis in 1894, the Gunung Subis limestone outcrop, until this study, was somewhat neglected by plant collectors (Pearce, 2003). Particularly for some of the earlier collections from non-limestone habitats that give the locality as 'Niah', it cannot be ascertained whether the collections were made within what is now the Niah NP area.

Methodology

This account is based on fieldwork at Niah NP during the period 2001 to 2003 and an examination of available literature. Field work included observations, an investigation of the use of gazetted rights and forest products and local botanical knowledge at Niah NP and recording plants in verification plots in seven vegetation types. The botanical expedition teams collected 303 fertile specimens of trees, shrubs and herbs and covered most of the vegetation types represented in the Park including some less well-collected areas, such as the summit of Gunung Subis, and areas to the Park's east.

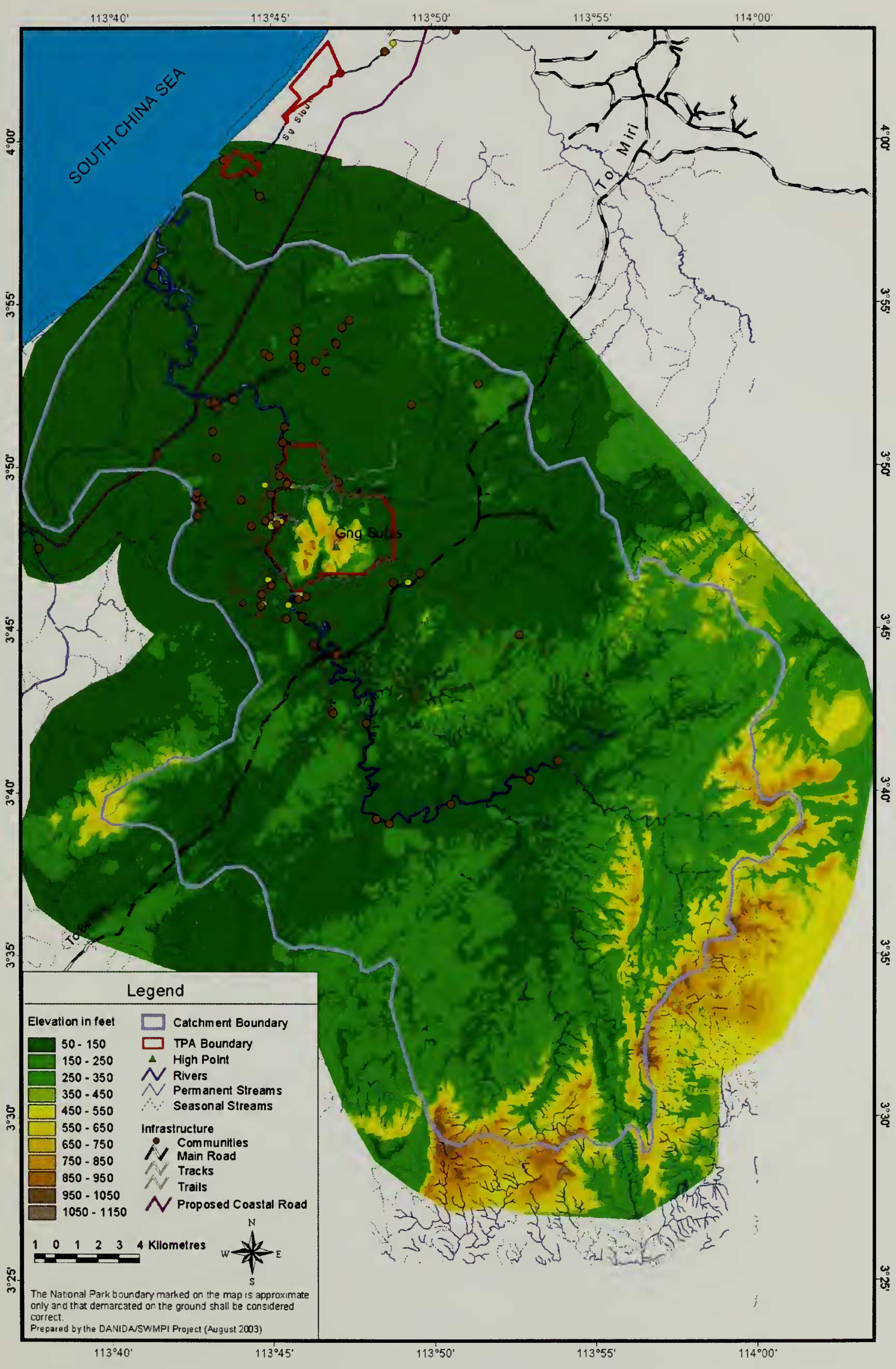
The specimens were subsequently identified by reference to the literature and comparison with specimens in the Herbarium, Sarawak Forest Department (SAR) and, for the Araceae, *Macaranga* species, Orchidaceae, Sterculiaceae and Zingiberaceae, with the help of experts. The identification of species of *Piper*, *Syzygium,* Lauraceae and Urticaceae posed problems as up-to-date revisions and/or well-annotated SAR herbarium specimens were not available.

The checklist includes specimens collected, recorded or observed during the DANIDA/SWMPI Project period, some mentioned in the literature and some SAR collections reliably identified by specialists. Fern classification is according to Parris and Latiff (1997).

Vegetation Types in the Park

Though small, the Park includes six distinct vegetation types, namely:

- **Limestone vegetation on karst** (rough limestone country with underground drainage) covers approximately 16 km^2 or *c*. 40% of the Park's area). It includes both the massif and surrounding scattered limestone fragments, large and small, which provide habitats for a variety of limestone plants; Sg Subis drains forest west of the limestone massif and flows over limestone bedrock in places
- **Mixed Dipterocarp Forest** (MDF) covering *c*. 16% of the Park chiefly on gentle to steep slopes to the Park's southwest where weathering has exposed the sandstone that underlies the limestone (Sg Trusan drains part of this MDF) and also a patch traversed by the Plank Walk from the Park Head Quarters to the Great Cave and also, south of this, a patch of MDF-Kerangas forest traversed by the Jalan Madu Trail



Map 1. Topography of Niah National Park and Surrounding Areas. (reproduced with permission of the Sarawak Forest Department).

- **Seasonal Swamp Forest on clayey marl soils** covers *c.* 10% of the Park on the Sg Niah and Sg Tangap floodplains, which are periodically inundated, sometimes to a depth of 3 m (the height of stranded debris), when, after intense rainfall, the rivers flood their banks and rainwater is slow to drain
- **Seasonal Swamp Forest on peat soils** covers *c.* 5% of the Park and is found in a patch of low-lying and periodically inundated land that lies between the levees of Sg Niah and Sg Tangap at the north of the Park and which has a different forest type from seasonal swamp forest on clayey marl soils
- **Riparian Forest** fringes the tidal and navigable Sg Niah and its slow-moving tributaries, Sg Tangap and Sg Sekaloh, the three rivers that bound the Park to the west, northeast and south, respectively
- **Regenerating Forest** covers *c.* 29% of the Park in areas that have been disturbed.

Limestone vegetation on karst

Karst hills provide a variety of microhabitats (Kiew 1991). Niah National Park's karst landscape includes summits, steep to vertical cliffs rising to more than 100 m, narrow gorges, broad valleys, complexes of extensive and spectacular caves and a pool, 'Telaga Kumang', located at the base of a karst wall.

The Subis massif summits are of jagged karst rocks with pockets of humus and soil in crevices (acidic where litter has accumulated) and surrounding skeletal (< 25 cm deep) mineral soils with rock particles. The massif's high point, Gunung Subis at 394 m, does not match altitudes reached by karst at Mulu and few collections mention the existence of a summit peat or 'mor' layer such as occurs on even quite low hills in the Kuching Division (Kiew *et al.* 2004).

Summit vegetation is characterized by a few species of trees. *Gymnostoma nobile* (ru ronang), with its characteristic rounded, soft-looking crowns of fine needle-twigs, is typical and abundant on undisturbed summits and there are also shrubs, numerous herbs and epiphytes. Orchids and ferns are well represented and *Paraboea speluncarum*[E], with its distinctive rosettes of pale leaves, is abundant.

Vegetation may differ from summit to summit. Exposed karst rocks and surrounding humus soil at the summit of Gunung Subis (partly disturbed by the setting up of a camp) support *Ficus deltoidea* and *F. sumatrana*; *Schefflera burkillii* and *Schefflera* species, *Medinilla botryocarpa*[E], a species each of

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[E] *Endemic to Borneo*

Cayratia, Mussaenda and *Fagraea* and orchid species while just below the summit were *Pandanus calcinactus*^E^, *Podocarpus confertus*, the jewel orchid *Dossinia marmorata*^E^, species of *Hemigraphis* and *Justicia* and the fern *Paragramma longifolia.* These species were not noted on the only accessible portion of Bukit Kasut summit (220 m, burnt in the past and suffering high visitor pressure). Altitude may be a factor restricting the distribution of *Pandanus calcinactus* and *Schefflera burkillii* to the summit of Gunung Subis since SAR specimens of the former species have (with one exception) only been collected from an altitude of at least 400 m and specimens of the latter from at least 780 m. However, SAR specimens of *Podocarpus confertus* have been collected from as low as 100–133 m altitude.

Species found at the summit of Bukit Kasut included *Macaranga endertii*^E^, the ferns *Antrophyum parvulum, Drynaria quercifolia, Phymatosorus scolopendria,* and species of *Asplenium, Pyrrosia* and *Loxogramme*; as well as *Dischidia albida* (Asclepiadaceae) and the legume *Ormosia sumatrana*, none of which were noted on the summit of Gunung Subis.

Burning has clearly modified summit vegetation. Distinct differences between the vegetation of burnt and un-burnt areas are apparent on Bukit Kasut, said to have been burnt *c.* 1997, and on summits opposite the West Mouth of the Great Cave, burnt in 1988 due to a lightning strike. There is much exposed limestone both at the summit and on slopes of the burnt area of Bukit Kasut and vegetation comprises scattered trees and shrubs to *c.* 4 m tall, with no *Gymnostoma nobile,* and a herb layer that includes drought resistant plants, such as *Paraboea speluncarum* and *Phymatosorus* sp. By comparison, a peak immediately to the southeast, separated by a ravine and thus inaccessible, is dominated by well-developed specimens of *G. nobile* to at least 10 m tall, with an understorey of shorter trees and bare limestone visible only on sheer vertical slopes. Similarly, the skyline of the cliff facing the Great Cave West Mouth, viewed from the West Mouth, has sparse *G. nobile* to the left (south) but a well-developed canopy of *G. nobile* and other species to the right (north).

Visitor pressure on steep, open parts of the trail leading to Bukit Kasut (the only trail to a limestone summit easily accessible to park visitors and also the habitat of the endemic *Begonia kasutensis*) has loosened the friable soil in places.

Exposed limestone faces, including cliffs and the sides of shady sinkholes, are typically dry and support little growth besides ferns and scattered clinging shrubs and herbs. On the other hand, limestone slopes can be comparatively well vegetated with scattered trees, some to 30 m tall, and an open canopy. This habitat supports some large dipterocarps including species of *Shorea* (lun or damar hitam and selangan batu), *Dipterocarpus* and *Dryobalanops* including *D. lanceolata* (kapur paji) and *D. beccarii* (kapur bukit), *Koompassia excelsa* (tapang), *Hopea andersonii* (luis somit), *Artocarpus* sp., *Popowia* spp., *Ficus* spp. and *Eusideroxylon zwageri* (belian) are present. Herbs include aroids and ferns.

Exposed limestone hills and cliffs may support scattered large trees and smaller trees, such as *Mallotus miquelianus, Streblus macrophyllus*^{E} and *Hydnocarpus gracilis.* Herbs include gingers, *Costus*, aroids and ferns, such as *Asplenium nidus* (bird's nest fern) that may reach a very large size, *A. salignum* and *Antrophyum parvulum.*

Shaded limestone outcrops occur in the seasonal swamp forest. They vary in size and shape and provide a range of niches differing in exposure and thus light, humidity and moisture availability, surface features (presence or absence and tilt of eroded bedding planes, which give the appearance of worn brickwork), aspect, inclination and presence of soil pockets in crevices and associated sinkholes and small ravines. Large strangling fig trees rooting into these outcrops are conspicuous and abundant. Lithophytes include aroids, orchids, ferns (e.g. *Cyclopeltis presliana*), begonias and the limestone specialists *Elatostema acuminata, Epithema sarawakensis*, and *Monophyllaea merrilliana.* Caves at Niah provide a continuum of plant microhabitats differing in substrate (combinations of bare rock/guano/soil), light and moisture availability (rock surfaces may be dry, damp or wet), inclination, aspect, altitude, etc. In the deepest shade algae and patches of liverwort cover the rocks. Ferns (*Tectaria devexa, Tectaria* sp., *Asplenium* spp.) occupy shaded areas, as do *Cyrtandra spelaea*^{E}, *Clerodendrum* sp. and *Elatostema acuminata.*

At the Great Cave entrance, karst specialist species include the ferns *Heterogonium pinnatum* and *Cyclopeltis presliana, Epithema sarawakensis* and two *Begonia* species. On exposed karst rocks and dry, soil-covered slopes in the same area six *Ficus* (fig) species, *Alstonia scholaris* (pelai) and *Piper* (wild pepper) occur. On slopes just outside the mouth of the Great Cave, cultivated/exotic species that have been planted or have escaped include *Sauropus androgynus* (cankok manis - a local vegetable, also recorded from Gua Pangomah in the Park), *Capsicum* sp. (chilli), *Areca catechu* (pinang), *Alocasia macrorrhizos* (keladi), *Carica papaya* (papaya) and an ornamental *Codiaeum.* Weeds (*Mikania cordata, Ageratum conyzoides* and *Oxalis corniculata*) also occur in this habitat.

Aroid species in limestone habitats at Niah NP included *Amorphophallus brachyphyllus, A. hewittii, Arisaema filiforme, Homalomena humilis, Raphidophora lobbii* and *Schizmatoglottis elegans, S. niahensis* and *Schizmatoglottis* sp. (the last is possibly a new species - A. Hay, *pers. comm.*).

Many limestone plants have very exacting niche requirements. For example, four of Niah's five *Begonia* species and *Monophyllaea merrilliana* each occupied highly localized limestone microhabitats.

Mixed Dipterocarp Forest

The mixed dipterocarp forest (MDF) in the Niah comprises impressive, mature trees, including emergents. Trees exceeding 100 cm dbh (exceptionally 200 cm dbh) were observed. The understorey comprised numerous saplings and seedlings, woody climbers and a few herbs. The MDF is likely to be of the humult ultisol type typically found on sandy soils with a surface horizon of loosely matted and densely rooted raw humus, low nutrient status and low water retention capacity (Ashton 1995). *Dryobalanops lanceolata, Shorea superba* and *Dipterocarpus caudiferus*, which can indicate this type of MDF, occur at Niah (*D. lanceolata* was observed in the Park). According to Ashton, humult ultisol MDF 'appears to be the richest in species of all forest types in Malaysia, because of its remarkable endemism'.

Large trees north of Sg Sekaloh and along Sg Trusan include *Shorea* spp. (meranti, selangan batu), *Dipterocarpus* spp. (keruing), *Sindora leiocarpa* (tampar hantu), Anacardiaceae sp. (rengas) and Chrysobalanceae sp. (merbatu). The MDF on the sandstone slopes at the Park's southwest included *Dryobalanops* spp. (kapur), *Dipterocarpus confertus* (keruing kobis) and *Shorea quadrinervis* (meranti sudu). In this area, belian has been extracted and *Antiaris toxicaria* (ipoh) tapped. The ground flora includes aroids.

Seasonal Swamp Forest on Clayey Marls

Seasonal swamp forest in Niah NP occurs on somewhat acid clayey marls, has a broken canopy, no emergents (some trees reach 20 m but the majority are shorter), and a dense understorey with herbs chiefly represented by climbers. There is low tree species diversity but high levels of gregariousness. *Octomeles sumatrana* (benuang), *Pterospermum subpeltatum* (bayur) and *Pandanus basilocularis* (a stilted screw-pine that reaches 10 m and is abundant beside the plank walk to the Painted Cave) are gregarious in this forest. *Dracontomelum dao* (sengkuang), *Pometia pinnata* (kasai) and *Anthocephalus cadamba* (kelampayan) also occur in this habitat. Much of the seasonal swamp forest at Niah has been disturbed. There are large belian stumps and the canopy is generally broken.

In seasonal swamp forest below the West Mouth of the Great Cave, belian, *Diospyros euphlebia*^{E}, *Ficus* spp. and *Saurauia* sp. (mata ikan) predominate. Aroids carpet the ground and some, e.g. *Pothos scandens*, climb.

Forest transitional between riverine and seasonal swamp forest occurs between Kuala Sg Subis and the foot of Bukit Kasut. Here are large fig trees, *Mallotus floribundus* (buantik), *Macaranga* (benuang), sengkuang, gregarious *Schoutenia glomerata* and *Lithocarpus blumeanus* (empili). Rattans (*Calamus sp., Daemonorops sparsiflora, Korthalsia* sp.) and *Caryota* sp., erect and creeping aroids, *Nepenthes* (pitcher plants), wild *Piper* species (including the locally abundant *P. sarmentosum*), *Costus speciosus*, gingers (*Boesenbergia* sp. and *Globba* sp.) and urticaceous herbs, as well as a number of woody and herbaceous climbers, occur here. At the base of Bukit Kasut and on the way to Telaga Kumang, mosses grow on rocks beside small channels.

Seasonal Swamp Forest on Peat Soils

At the north of the Park, a small area between the levees of Sg Niah and Sg Tangap had, where sampled, an organic horizon >150 cm deep and peat soil with 76% loss on ignition (peat soil has >65% loss on ignition). Small channels and pools of standing water occur. This forest had a broken canopy (extraction was reported to have occurred in the past), some emergents to 25 m and shorter trees to 20 m or less, a dense understorey with abundant saplings and seedlings of primary forest species, herbs, woody climbers and abundant bryophytes on tree roots.

Peat swamp timber species that occur in this forest include *Copaifera palustris* (sepetir paya), *Dactyloclados stenostachys* (jongkong), *Gonystylus* sp. (ramin), *Shorea* sp. (meranti), *Dryobalanops rappa* (kapur paya) and *Combretocarpus rotundatus* (keruntum) as well as large trees of *Parishia* sp. (upi). There are also seedlings of *Parishia maingayi* (upi paya) and *Vatica mangachapoi* (resak paya).

Other trees include the riverine kasai, *Elaeocarpus stipularis* (sengkurat) and *Vatica umbonata*, the swamp species *Quassia indica*, and other trees including figs, *Stemonurus secundiflorus* var. *lanceolatus* (semburok), *Blumeodendron tokbrai* (merbulan), *Diospyros pilosanthera* (kayu malam), *Syzygium* spp. (ubah), *Memecylon* sp. (nipis kulit) and *Santiria laevigata*. The swamp palm *Eleiodoxa conferta* (asam paya) and the aroids *Raphidophora korthalsii* and *R. lobbii* occur here.

Riparian Forest

The banks of Sg Niah, where it bounds the Park, are occasionally flooded and are occasionally under saline influence as the river is tidal at this point. A well-developed riparian fringe includes abundant *Lithocarpus blumeanus*, frequent sengkurat and buantik and frequent, large specimens of sengkuang. The climber *Willughbeia* sp. (akar kubal) is moderately frequent and kasai scattered. *Dipterocarpus oblongifolius* (ensurai) was recorded. Fruit trees that have been planted behind the riverbanks include *Durio zibethinus* (the cultivated durian), two wild *Durio* species with edible fruits (nyakak and isu), *Mangifera pajang* (embang) and *Artocarpus odoratissimus* (terap).

Sungai Sekaloh appears to have lost most of its original riparian vegetation. Sungai Subis, a muddy, slow flowing river with muddy banks, flows through seasonal swamp forest at the north and west of the Subis massif. No macrophytes were noted either in the water or on the banks in this moderately to deeply shaded habitat. To the west of the Subis massif, towards Kuala Subis, the stream is bigger and the riverside trees sengkuang, kasai and benuang are common while fig trees are abundant.

Regenerating Forest

About 29% of the Park is now in various stages of regeneration after having been disturbed. Some of the area was formerly used for shifting cultivation. Some timber extraction has taken place. Regeneration, occurring over different time intervals, on different soil types and presumably after different types and degrees of disturbance, is by no means uniform. A plot set in old secondary forest, where a charcoal layer in the clay loam to sandy loam soil suggested past clearance for agriculture, had emergents reaching 30 m and 110 cm dbh, though most trees were 25 m or less. In this 20 x 20 m plot there was a dense understorey of numerous saplings of primary forest species, a few herbs, some woody climbers and almost no ferns or palms. The mix of primary forest species in this plot included only one individual belonging to the Dipterocarpaceae.

The Park's Flora

The flora of Niah NP is as yet incompletely known. To date, more than 800 plant specimens from Niah NP are deposited at SAR. This includes more than 300 specimens collected during the SWMPI project botanical field investigations. Orchids and palms appear to be under-collected. New species of aroid (A. Hay, P. Boyce, *pers. comm.*) *Paraboea, Schumannianthus* and *Boesenbergia* (A. Poulsen, *pers. comm.*) are still to be described from specimens collected in the park.

Orchid species reported with certainty from the Park to date are surprisingly few. Beaman *et al.* (2001) list nine genera and species (*Agrostophyllum* sp., *Bulbophyllum minutulum, B. vaginatum, Calanthe triplicata, Coelogyne verrucosa, C. pandurata, Didymoplexiella borneensis*^{E}, *Dossinia marmorata*^{E} and *Plocoglottis borneensis*). However, they mention 31 orchid species as originating from 'Niah' (six terrestrial, one lithophytic and two saprophytic) and at least some of these are likely to be found in the Park as all but four are noted as occurring at least occasionally on karst. The SWMPI study has added *Agrostophyllum glumaceum, Liparis elegans* and *Thecostele alata* while *Anoectochilus* sp. was photographed and *Claderia viridiflora* observed just off park trails.

Dossinia marmorata is an attractive jewel orchid of karst found also at Bau and Mulu. *Adenoncos triloba*^{E}, an epiphytic orchid of lowland karst hills described in 1935, is known only from the type specimen from Niah. Beaman *et al.* (2001), applying IUCN Red List Categories to orchid taxa known only from Sarawak, consider *Adenoncos triloba* to be Critically Endangered and both *Malaxis andersonii* (a terrestrial karst species) and *Didymoplexiella borneensis* (a saprophyte of hill forest sometimes found on karst) as Endangered. There are unconfirmed reports that a slipper orchid (*Paphiopedilum* sp.) occurs near the karst summits at Niah.

Orchids not associated with karst include two attractive terrestrial species, *Plocoglottis borneensis* and *Calanthe triplicata.*

Palms observed, reported or recorded from in and around the Park include *Caryota no*, *Areca andersonii*^E, which is known only from the type specimen from Niah (Dransfield 1984) and from Brunei , *Licuala borneensis*^E (previously collected in 1867 in Tubau but no longer there (Saw Leng Guan *pers. comm.*) and at Niah collected in secondary forest), and rattans including *Calamus myriacanthus*^E, *C. caesius* and *C. scipionum*, *Daemonorops microstachys*^E and *D. sparsiflora*^E.

Well-represented groups at the Park include:

ferns and fern allies - 31 species including *Taenitis trilobata* (Holttum 1968) described from Niah and known from only two localities in Sarawak; possibly two new records for Sarawak (*Adiantum* cf. *malesianum* and *Asplenium subnormale), Mesophlebion oligodictyon* (originally described as *Dryopteris oligodyctia* from Niah) and five species (*Syngramma wallichii, Lindsaea borneensis, Tectaria aurita, Leptochilus macrophyllus* and *Monogramma paradoxa*) collected by H. Schneider (*pers. comm.*),

Acanthaceae with 9 species including *Cosmianthemum dido*, described from within the Park,

Annonaceae with 15 species,

Araceae with 19 species includes *Schizmatoglottis niahensis* and *Alocasia venusta*, which are both endemic to Niah NP,

Begoniaceae with five *Begonia* species, all new to science and endemic to Gunung Subis (Pearce 2003),

Euphorbiaceae with 13 species,

Gesneriaceae includes *Cyrtandra cretacea*^E (Burtt 1970) and *C spelaea*^E (Burtt 1978), both described from Niah and the latter endemic to the Park; *Monophyllaea merrilliana* (*Monophyllaea* had not previously been reported from Niah), and *Paraboea speluncarum* and *Paraboea* sp. nov. endemic to the Park,

Moraceae - *Ficus* is especially diverse with eight species and *Streblus macrophyllus* is a new record for Sarawak,

Rubiaceae with 14 species,

Urticaceae is represented by 11 species, and

Vitaceae includes *Ampelocissus capillaris* and a *Cayratia* from the summit of Gunung Subis that could not be matched at SAR.

This array of plant groups largely mirrors those Anderson (1965) reported as being well represented on limestone in Sarawak (Annonaceae, Begoniaceae, Euphorbiaceae, Gesneriaceae and Moraceae).

The Park is reported to be rich in both **wild and cultivated fruit tree species**. Informants interviewed regarding gazetted rights to collect fruits, etc., in the Park mentioned a total of more than 30 fruit tree species. These include species of *Mangifera* (Anacardiaceae), *Willughbeia* (Apocynaceae), *Durio*

(Bombacaceae), *Lansium* (Meliaceae), *Artocarpus* (Moraceae) and *Nephelium* (Sapindaceae). Other species include *Gnetum gnemon* (meninjau), *Pangium edule* (kepayang) and *Dialium indum* (keranji).

Useful species in the Park include *Eurycoma longifolia* (tongkat ali), locally well-known owing to its reputed aphrodisiac properties; *Dyera polyphylla* (jelutong paya) formerly tapped for latex for export to make chewing gum (a tree showing tapping scars is just beside the plank walk to the Great Cave and jelutong is said to have been harvested for timber in the Park); *Goniothalamus velutinus* (kayu hujan panas, lim panas)–a treelet common on sandy soil and *kerangas* forest that is locally highly valued based on its supposed magical powers to protect against evil forces; *Antiaris toxicaria* (ipoh) - a tree tapped for its cardiac-glycoside-containing latex, an ingredient of blowpipe dart poison; palms with edible cabbages; rattan canes (*Calamus caesius* (sega) and other species) for tying scaffolding used to collect edible birds' nests in caves, for handicrafts and for weaving; and *Pandanus andersonii* (kerupok) and *P. ?vinaceus* - (akas or akah) whose leaves are collected for making mats.

Endemicity

Little information on endemicity is available for most plant groups in Sarawak. Wong (1998) listed endemic species of selected taxa in Borneo, which indicated endemicities ranging from 8% (*Aglaia*) to 92% (*Vaccinium*).

Limestone forest in Borneo is rich in endemics particularly among herbaceous species (Ashton 1995). Wong (1998) noted that nearly all of the 15 *Paraboea* species in Borneo are locally endemic to karst and 16 of the 17 species of *Monophyllaea* are specifically confined to it. Wong mentioned *Cyrtandra* species and *Pandanus calcinactus* as Sarawak karst plants and notes that the 'inselberg' (island mountain) nature of the majority of the karst outcrops in Borneo appears to have promoted speciation among such groups as the gesneriads, balsams and begonias. Likewise, Kiew (1991), with reference to the limestone flora in Peninsular Malaysia, states that for some herbaceous groups such as the *Paraboeas*, recent speciation appears to have occurred as a result of isolation, so that many species are confined to a particular hill or group of hills.

The Subis massif is indeed well isolated from other Sarawak karst formations (Bau and Padawan-Serian in the southwest; Bukit Sarang southeast of Bintulu; Mulu to the northeast, and the Upper Baram limestone in the interior). So far, the following endemics from the Subis massif have been reported: *Alocasia venusta* and *Schismatoglottis niahensis* (Araceae), *Begonia kachak*, *B. kasutensis*, *B. niahensis*, *B. stichochaete* and *B. subisensis* (Begoniaceae), *Tectaria andersonii* and *T. subdigitata* (Dryopteridaceae) (Holttum 1991) both known only from the type specimens, *Cyrtandra spelaea*

Table 1. List of species endemic to Borneo reported from Niah National Park
*endemic to the Niah National Park, excluding new species

Adiantaceae	*Adiantum malesianum* Ghatak
Annonaceae	*Goniothalamus calcareus* Mat Salleh
	Goniothalamus velutinus Airy Shaw
	Orophea sarawakensis Kessler
Araceae	**Alocasia venusta* A. Hay
	**Schismatoglottis niahensis* A. Hay
Arecaceae	*Areca andersonii* J.Dransf.
	Calamus myriacanthus Becc.
	Daemonorops microstachys Becc.
	Licuala borneensis Becc.
Aspleniaceae	*Asplenium subnormale* Copel.
Begoniaceae	**Begonia kachak* K. G. Pearce
	**B. kasutensis* K. G. Pearce
	**B. niahensis* K. G. Pearce
	**B. stichochaete* K. G. Pearce
	**B. subisensis* K. G. Pearce
Dryopteridaceae	**Tectaria andersonii* Holttum
	**T. subdigitata* (Baker) Copel.
Ebenaceae	*Diospyros euphlebia* Merr.
Euphorbiaceae	*Macaranga endertii* Whitmore
Gesneriaceae	*Cyrtandra cretacea* Kraenzlin
	**C. spelaea* B. L. Burtt
	**Paraboea speluncarum* (Burtt) Burtt
Melastomataceae	*Medinilla botryocarpa* Regalado
Moraceae	*Ficus hemselyana* King
	Streblus macrophyllus Blume
Orchidaceae	**Adenoncos triloba* Carr
	Didymoplexiella borneensis (Schltr.) Garay
	Dossinia marmorata E.Morren
Pandanaceae	*Pandanus calcinactus* St John *ex* Stone

and *Paraboea speluncarum* (Gesneriaceae) and *Adenoncos triloba* (Orchidaceae), known only from the type specimen. In addition, five species are probably new to science but have yet to be described: *Schefflera* 'niah' (Araliaceae), which grows on mudstone outcropping from riverbank (D. Frodin *pers. comm.*), *Schismatoglottis* (Araceae) from the foot of the limestone hill (A. Hay, *pers. comm.*), an *Anadendrum* (P.C. Boyce, *pers. comm.*), a *Paraboea* (Gesneriaceae), a *Schumannianthus* (Marantaceae, A. Poulsen *pers. comm.),* and a *Boesenbergia* sp. collected by A. Poulsen (A. Poulsen *pers. comm.*).

Conclusion

Niah NP is remarkable on account of the variety of vegetation types represented, including a variety of limestone habitats, as well as its history of human interaction. That the Park should support a rich and varied flora is not unexpected in view of the diversity of substrates, relief (especially in karst areas) and processes (flooding, fire and human disturbance, including shifting cultivation and extraction of timber and forest products). While the limestone is relatively dry and mostly without peat formation at summits, it still supports a number of plants that have yet to be described or could not be identified by reference to the SAR collection, as well as new records for Sarawak and Niah. Inaccessible parts of the limestone are still to be explored botanically. Meanwhile, a range of stresses impacts the Park. These include its isolation by surrounding development, human disturbance by bird nest and guano collectors, visitors and, just outside the Park boundary, quarrying, and the depletion of Park resources (birds' nests, guano, timber, forest products, ornamentals, hunted wildlife, etc). An initiative to fully explore, interpret and conserve this special area is urgently needed.

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Appendix: Preliminary Checklist of Plants Collected and Reported from Niah National Park

Note: Most descriptions of plants and habitats are taken directly from field notes. The specimens listed are deposited in the Herbarium, Sarawak Forestry Department (SAR).
emperan is the Sarawak term for alluvial forest
kerangas is the Iban word for forest that when cleared is not suitable for growing hill padi
* species associated with limestone at Niah National Park
^{E} species endemic to Borneo
G Gunung (mountain)
MDF mixed dipterocarp forest
NP National Park
Sg Sungai (river or stream)
Tj Tanjung (headland)

ACANTHACEAE
Cosmianthemum dido Burtt & Smith
Pathside in primary forest. Pengkalong Lobang to Niah Cave *B.L. Burtt & P.J.B. Woods B 1998.*

Cosmianthemum magnifolium Brem.
Herb 25–40 cm tall. Disturbed peat swamp forest, open area by trail, peat soil. Along N Park boundary from Tj Belipat *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89235*; MDF, brown clay soil. Sekaloh *Jemree Sablee et al. S 89017.*

**Hemigraphis* sp.
Woody shrub 60 cm tall. Exposed limestone rocks and humus soil, open, canopy 5 m tall. Just below summit of G Subis. *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89429.*

**Justicia* sp.
Woody shrub *c.* 1 m tall. Exposed limestone rocks and humus soil, open, canopy 5 m tall. Just below summit of G Subis *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89430.*

**Linariantha bicolor* Burtt & Smith
Creeping herb. Limestone forest at foot of limestone hill, light shade, in soil at base of limestone rocks. On path to Telaga Kumang *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89410.*

?*Polytrema* sp.
Herb 25 cm tall. On trail, open area, clay soil. Near Sg Subis *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89457.*

*?*Pseuderanthemum* sp.
Shrub 40 cm tall. Foot of limestone hill. Ulu Sg Tangap *Jemree Sablee et al. S 89072.*

**Ptyssiglottis* sp.
Semi-woody plant c. 60–200 cm tall. Forest at base of limestone crags, light shade, humus soil also high ground, light shade by path, loamy soil (locally common) *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89272*; Along N Park boundary from Tj Belipat. *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89236.*

Acanthaceae sp.
Creeping herb. On trail in open, clay soil. Near Sg Subis *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89456.*

ADIANTACEAE
**Adiantum* cf. *malesianum* ^{E} Ghatak
Creeping herb c.15 cm tall. Light shade in forest, humus soil among limestone outcrops, under wall of limestone, below summit of G Subis *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89438.*

Syngramma alismifolia (C. Presl) J.Sm.
Herb 30 cm tall. Disturbed peat swamp forest, open area by trail, peat soil. Along N Park boundary from Tj Belipat *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89219.*

Syngramma wallichii Hook.
Collected by H. Schneider (*pers. comm.*).

Taenitis trilobata Holttum
Niah. *C. Hose s.n., 1890.* (in Holttum, 1968).

ANACARDIACEAE
**Dracontomelum dao* (Blanco) Merr. & Rolfe
Tree *c.* 1 m girth, 24 m high. S side of G Subis, in Sg Sekaloh, Niah. *J.A.R. Anderson, Sonny Tan & E. Wright S 27577.*

Mangifera pajang Kosterm.
Observed behind the banks of Sg Niah.

Semecarpus rufovelutinus Ridley
Tree 8 m tall, c. 5 cm diam. Disturbed peat swamp forest, open area by trail, peat soil with pools of standing water. Along N Park boundary from Tj Belipat *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89216.*

ANISOPHYLLACEAE
Combretocarpus rotundatus (Miq.) Danser
Observed in seasonal swamp forest on peat soils in the N of Park.

ANNONACEAE
Cyathocalyx cf. *havilandii* Boerl.
Treelet 2 m tall. Disturbed forest, moderate shade. Tj Belipat, along boundary from Sg Niah, 100 m from river *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89203.*

Ellipeia cuneifolia J.D.Hook. & Thompson
Woody climber 12 m tall, base of stem 6 cm diam. Seasonal swamp forest (disturbed), light shade, clay soil. Trail into park from Kuala Sg Subis *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89284.*

**Enicosanthum macranthum* (King) J. Sinc.
Tree 10 m tall, 16 cm diam. Alluvial limestone lowland forest at the foot of limestone hills from Rumah Chang, Sg Tabau *Julaihi Abdullah, Kit Pearce et al. S 89321.*

Goniothalamus cf. *calcareus* E Mat Salleh
Treelet 1.5–2 m tall, 1 cm diam. MDF, brown clay soil also secondary forest, moderate shade, loam soil. Sekaloh. *Jemree Sablee et al. S 89008*; Close to Sg Niah *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89251.*

**Goniothalamus* cf. *uvarioides* King
Tree 7 m tall, 6 cm diam. Limestone forest, alluvial, medium shade. Gua Sibau, trail from Rumah Chang, NE of the Park. *Julaihi Abdullah, Kit Pearce et al. S 89318.*

Goniothalamus velutinus E Airy Shaw
Treelet 2 m tall, 2 cm diam. MDF, brown clay soil. Sekaloh *Jemree Sablee et al. S 89018.*

Orophea kostermansia Kessler
Tree to 6 m tall, 20 cm diam. Shady lowland alluvial forest. Along plank walk to Niah Caves *Julaihi Abdullah, Kit Pearce et al. S 89305.*

**Orophea sarawakensis* E Kessler
Tree 7 m tall, 5 cm diam. S boundary of park, E of Quarry *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89495.*

Polyalthia cauliflora J.D.Hook. & Thompson var. *beccarii* (King) Sinclair
Tree 6 m tall, 7 cm diam. MDF, Sg Sekaloh *Jemree Sablee et al. S 89031.*

Polyalthia motleyana (Hk.f.) Airy Shaw var. *motleyana*
Tree 4 m tall, 7 cm diam. MDF, Sg Sekaloh *Jemree Sablee et al. S 89036.*

Popowia pisocarpa (Blume) Endl.
Tree c 7 m tall, 5 cm diam. Secondary forest, moderate shade, loam soil. Close to Sg Niah *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89250.*

*?*Popowia*
Small tree 3 m tall, 6 cm diam. Limestone forest. G Subis *Jemree Sablee et al. S 89046.*

**Uvaria grandiflora* Roxb. ex Homem.
Woody climber 17 m tall, 2 cm diam. Limestone forest, light shade, humus soil among limestone rocks at the top of limestone summit *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89404.*

Uvaria sp.
Woody climber c. 15 m tall, stem 3 cm diam. Disturbed peat swamp forest, open area by trail, peat soil. Along N Park boundary from Tj Belipat *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89225.*

Woodiellantha sympetala (Merr.) Rauschert
Small tree 8 m tall, 7 cm diam. MDF. Sg Sekaloh *Jemree Sablee et al. S 89024.*

APOCYNACEAE
**Alstonia scholaris* R. Br.
Observed at the mouth of the Great Cave.

Dyera polyphylla (Miq.) Ashton
Observed along the plank walk to the Great Cave.

Tabernaemontana macrocarpa Jack
Tree 7 m tall, 6.5 cm diam. Disturbed forest, grey clay under 25 cm peat, moderate shade. Close to Sg Niah *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89257.*

Tabernaemontana pauciflora Blume
Shrub 1 m tall. Seasonal swamp forest (disturbed), open area. Beside plank walk to Great Cave *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89469.*

AQUIFOLIACEAE
**Ilex* sp.
Tree to 3 m tall, 10 cm. diam. Shady lowland alluvial forest. Limestone hill next to Quarry *Julaihi Abdullah, Kit Pearce et al. S 89313.*

ARACEAE
Aglaeonema nebulosum N.E.Br.
Herb *c.*15–20 cm tall. Tj Belipat, along boundary from Sg Niah *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89208*; On path to Telaga Kumang *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89409.*

Aglaeonema nitidum (Jack) Kunth
Herb 60–100 cm tall. Just beside inundated area with standing water, clay soil, moderate shade, also seasonal swamp forest (disturbed), light shade and secondary forest, moderate shade, loam soil. Tj Belipat, along boundary from Sg Niah *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89211*; Beside plank walk to Great Cave *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89464*; Close to Sg Niah *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89247.*

**Alocasia venusta* A. Hay
Herb to 45 cm tall. Lithophytic on limestone in swamp forest *c.* 200 m alt. Path between Niah town and Niah caves *Hay et al. 9346.*

**Amorphophallus brachyphyllus* Hett.
Lithophytic herb c. 1.5 m tall, stem c. 60 cm, 2.5 cm diam. Disturbed forest among limestone rocks, light shade also shady lowland alluvial forest. Below W mouth of Great Cave *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89487*; Along plank walk to Niah Caves *Julaihi Abdullah, Kit Pearce et al. S 89309.*

**Amorphophallus hewittii* Alderw.
Herb 1 m tall. Limestone forest, light shade, humus soil amongst limestone rocks. Top of limestone summit *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89408.*

Anadendrum microstachyum (deVr. & Miq.) Baker & Alderw.
Herbaceous climber 1.5 m tall. *Emperan* forest, dark brown clay soil, also MDF, light shade,

loam soil *Jemree Sablee et al. S 89006*; Across river from Park HQ *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89444.*

Anadendrum sp. nov.
Climbing herb 1 m tall. Cut petiole without raphides, immature fruits yellow-green. Disturbed swamp forest in standing water, moderate shade, grey clay with wet humus layer. Close to Sg Niah *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89264.*

**Arisaema filiforme* Blume
Herb 30 cm tall. Forest at base of limestone crags, light shade, humus soil *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89273.*

Cryptocoryne zonata de Wit
Aquatic herb with leaves slightly above water surface. In water in dry regenerating peat swamp forest also in stagnant pool, light shade, disturbed forest. *Jemree Sablee et al. S 89041*; Across river from Park HQ *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89440.*

Homalomena cf. *hostifolia* Engl.
Herb 20 cm tall. Undisturbed MDF, medium shade, loamy soil *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89268.*

**Homalomena humilis* (Jack) Hk.f.
Herb15 cm tall. Limestone forest on stone, also on limestone rocks in forest at base of limestone crags in light shade, stony mineral soil and on limestone rocks in pockets of mineral soil, medium shade. G Subis *Jemree Sablee et al. S 89042*; *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89275*; Near Sg Subis *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89459.*

Homalomena sp.
Herb 70 cm tall. MDF, light shade, loamy soil. At base of limestone crags *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89279.*

Lasia spinosa (L.) Thwaites
Herb *c.*1.3 m tall. Just beside inundated area with standing water, clay soil, moderate shade, among litter. Tj Belipat, along boundary from Sg Niah *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89209.*

Raphidophora korthalsii (*tenuis* facies) Schott.
Herb *c.* 50 cm tall. Disturbed peat swamp forest, open area by trail, peat soil. Along N Park Boundary from Tj Belipat *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89234.*

**Raphidophora lobbii* Schott.
Climber 10–350 cm tall. Disturbed peat swamp forest among limestone rocks, also open area by trail, peat soil with pools of standing water, light shade. Below W mouth of Great Cave *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89486*; Along N Park boundary from Tj. Belipat *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89217*; *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89222.*

**Schismatoglottis elegans* A. Hay
Lithophytic herb c. 50 cm tall. Limestone forest, alluvial, medium shade, on limestone outcrops. Gua Sibau, trail from Rumah Chang, NE of Park *Julaihi Abdullah, Kit Pearce et al. S 89319.*

**Schismatoglottis niahensis* A. Hay
Clustering herb 0.6 m tall. Limestone forest, medium shade, peaty soil at base of limestone rocks. Near Sg Subis *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89454*

**Schismatoglottis puberulipes* Alderw.
Limestone. *Hay et al. 9369.*

**Schismatoglottis* sp. nov. (P.C. Boyce, *pers. comm.*)
Herb 25 cm tall. Leaf upper surface lustrous, dark green, pale beneath, spathe pale green with brownish purple bracts, ovaries green, stamens (above) cream. Limestone forest at foot of limestone hill, light shade, in soil at base of limestone rocks. On path to Telaga Kumang *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89411.*

ARALIACEAE
**Schefflera burkillii* Merr.
Herbaceous climber 1.5 m tall. Open summit of G Subis *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89413.*

**Schefflera petiolosa (Miq.) Harm.*
Lithophytic shrub 1.5–5 m tall. Limestone rock in secondary seasonal swamp forest also disturbed seasonal swamp forest, light shade, by stream. Trail into park from Kuala Sg Subis *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89290*; Beside Plank Walk to Great Cave *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89467.*

Schefflera sp. nov. (D. Frodin, *pers. comm.*)
Epiphyte. Greenish orange fruits. Ulu Sg Sekaloh, Sg Niah *J.A.R. Anderson S 27296.*

**Schefflera* sp.
Herb 1 m tall, climbing on rocks. Open summit of G Subis. *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89412.*

ARECACEAE
**Areca andersonii* ^{E} J.Dransf.
Palm 1–2. 6 m tall, 1.5 cm diam. MDF, Sekaloh *Jemree Sablee et al. S 89019;* Sg Sekaloh, G Subis, Niah *J.A.R. Anderson S 31937.*

Areca minuta Scheff.
Palm 2.5 m tall, 1 cm diam at base. MDF/*Kerangas* forest, moderate shade, sandy loam soil. Jalan Madu Trail *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89447.*

Calamus myriacanthus ^{E} Becc.
Rattan 2–7 m tall. MDF, light shade, loam soil. Across river from Park HQ *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89445 & S 89446.*

Calamus myriacanthus ^{E} Becc.
(All Borneo Rattan Database, J. Dransfield, 2000)

Caryota no Becc.
Observed in the valley outside the West Mouth of the Great Cave.

Daemonorops korthalsii Blume
Rattan *c.* 10 m tall. Disturbed secondary forest, moderate shade, clay soil. Along N Park boundary from Tj Belipat. *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89212.*

**Daemonorops longipes* (Griff.) Mart.
Rattan 6 m long. Foot of limestone, 17 m asl. G Brangin, Ulu Sg Subis, Niah NP *Yii Puan Ching S 40174.*

Daemonorops sparsiflora Becc.
Rattan 10 m long. Riverine forest, along Sg Niah, Niah NP *Yii Puan Ching S 40147.*

Iguanura curvata Kiew
Palm *c.* 1 m tall. In disturbed alluvial forest with silty clay soil (not very common). Niah NP *Paul Chai S 40056.*

Licuala borneensis ^{E} Becc.
Clustered palm 80 cm tall. Secondary forest, moderate shade, loam soil. Close to Sg Niah. *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89248.*

Licuala sp. 1
Solitary to 1 m tall. Shady lowland alluvial forest. Along plank walk to Niah Caves *Julaihi Abdullah, Kit Pearce et al. S 89301.*

Licuala sp. 2
Clustered palm 1 m tall. Disturbed swamp forest, in standing water, moderate shade, grey clay with wet humus layer. Close to Sg Niah. *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89263*

**Pinanga albescens* Becc.
Palm in shade on limestone rock at base of limestone hill *J.A.R.Anderson S 16028.*

ASCLEPIADACEAE
**Dischidia albida*
Vegetation verification plot specimen at summit of Bukit Kasut.

**Dischidia hirsuta* (Blume) Decne.
Small climbing epiphyte. Lower slopes of limestone hill, large limestone boulders. Sg Sekaloh, G Subis, Niah *J.A.R. Anderson S 31924.*

**Dischidia cf. tubulifera* King & Gamble
Small climber. Summit ridge of limestone, 270 m altitude, limestone strongly dissected and covered by 15–22 cm peat layer. Sg Sekaloh, G Subis, Niah *J.A.R. Anderson S 31930*

ASPLENIACEAE
* *Asplenium macrophyllum* Sw.
Terrestrial fern. Rare on limestone rocks in semi-exposed position, slope between caves, limestone rocks and residual soil, trees mainly felled, habitat semi-exposed. also inside Gua Tulang on rock. Great Cave, G Subis, Niah *J.A.R. Anderson S 31916*; *Mohidin S 21691*; Niah *Ahmad 104.*

**Asplenium nidus* L.
On tree in old forest. G Subis *Ahmad 102.*

**Asplenium nitidum* Sw.
Epiphyte on rock. Shady lowland alluvial forest. Along plank walk to Niah Caves *Julaihi Abdullah, Kit Pearce et al. S 89307.*

**Asplenium salignum* Blume
Herb (may be epiphytic) 60 cm tall. Disturbed limestone forest on and among rocks, light shade. Below W mouth of Great Cave *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89485*; Ulu Sg Sekaloh, near Quarry *Jemree Sablee et al. S 89069.*

**Asplenium scandens* J.Sm. ex Mett.
Herb c. 50 cm tall. On limestone rocks, light shade, almost no soil. Near Sg Subis *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89461.*

**Asplenium subnormale* ^{E} Copel.
Creeping herb. On limestone rocks in pockets of mineral soil, medium shade also shady lowland alluvial forest. Near Sg Subis *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89453;* Along plank walk to Niah Caves *Julaihi Abdullah, Kit Pearce et al. S 89304.*

**Asplenium vittaeforme* Cav.
Epiphytic fern on fallen branch. Foot of limestone forest, sandy soil. Ulu Sg Trusan *Jemree Sablee et al. S 89056.*

BEGONIACEAE
**Begonia kachak* K.G.Pearce
Creeping herb, 11–25 cm tall. Foot of limestone hill, on rocks, light shade, almost no soil also shade at base of limestone cave wall. Great Cave *Jemree Sablee et al. (S 89062), Kit Pearce, Bibian Diway, Saupel Atot and Dami Jude S 78536*; Near Sg Subis *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89463.*

**Begonia kasutensis* K.G.Pearce
Creeping fleshy herb c. 10 cm tall. Limestone forest also on steep path in soil between limestone rocks where canopy cover starts to thin out. G Subis *Jemree Sablee et al. S 89049*; On route to Bukit Kasut *Kit Pearce & Narawi Johari S 78596.*

**Begonia niahensis* K.G.Pearce
Sprawling herb c. 40 cm long. On limestone rocks, light shade, almost no soil also exposed steeply sloping limestone rocks, rooted in a pocket of soil in the rocks. Near Sg Subis *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89460;* Great Cave *Kit Pearce, Bibian Diway, Saupel Atot and Dami Jude S 78537.*

**Begonia stichochaete* K.G.Pearce
Erect herb 15–25 cm tall. Undisturbed MDF, medium shade, loamy and brown clay soil, also disturbed *emperan* forest, deep alluvial soil, light shade also on low limestone outcrops and in soil surrounding limestone outcrops in deep shade and damp conditions. Sekaloh *Jemree Sablee et al. S 89014*; *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89267*; Banks of Sg Niah near confluence with Sg Subis *Kit Pearce, Bibian Diway, Saupel Atot and Dami Jude S 78539;* On route to Bukit Kasut *Kit Pearce & Narawi Johari S 78597.*

**Begonia subisensis* K.G.Pearce
Herb *c.* 45 cm tall. Near summit on limestone rooted in crevices in soil pockets, partial shade also on steep slopes between limestone rocks where canopy cover starts to thin out (locally frequent). Bukit Kasut *Kit Pearce, Bibian Diway, Saupel Atot and Dami Jude S 78538*; On trail to Bukit Kasut *Kit Pearce & Narawi Johari S 78598.*

BIGNONIACEAE
*?*Tecomanthe* sp.
Woody climber 5 m tall. In forest with canopy c. 20 m tall, light shade, humus soil among limestone outcrops. Below summit of G Subis *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89436.*

CASUARINACEAE
Gymnostoma nobile (Whitmore) L.A.S. Johnson
Observed on summits. Abundant.

CELASTRACEAE
Microtropis sp.
Treelet 1.5 m tall, 2 cm diam. MDF. Sg Sekaloh *Jemree Sablee et al. S 89034.*

CHLORANTHACEAE
**Chloranthus erectus* (Buch.-Ham.) Verdc.
Herb c. 1 m tall. Limestone forest, alluvial, medium shade. Gua Sibau, trail from Rumah Chang, NE of park *Julaihi Abdullah, Kit Pearce et al. S 89324.*

CHRYSOBALANACEAE
Parinari sp.
Tree c. 40 m tall, 90 cm diam above 6 m tall buttresses. Secondary forest, moderate shade, loam soil. Close to Sg Niah *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89252.*

CLUSIACEAE
*?*Mesua/Mammea/Kayea*
Tree 2.2 m tall, 1.5 cm diam. Forest at base of limestone crags, light shade, stony mineral soil *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89269.*

CONVALLARIACEAE
**Peliosanthes teta* Andr. ssp. *humilis* (Andr.) Jessop
Erect herb c. 35 cm tall. Limestone forest, medium shade, in litter at base of limestone rock. Abundant in this seasonally wet location. Beside plank walk to Great Cave *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89472.*

COSTACEAE
Costus speciosus (Koenig) R.M. Smith

CRYPTERONIACEAE
Dactyloclados stenostachys Oliv.
Observed in seasonal swamp forest on peat soils in the N of the Park.

CYPERACEAE
Hypolytrum nemorum (Vahl) Spreng
Herb *c.* 80 cm tall. Along N Park boundary from Tj Belipat *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89241.*

DATISCACEAE

Octomeles sumatrana Miq.
Medium sized tree 23 m tall, 1 m girth. River bank on sandy soil. Ulu Sg Sekaloh, Sg Niah *J.A.R. Anderson S 27298.*

DENNSTAEDTIACEAE

Lindsaea borneensis
Collected by H. Schneider (*pers. comm.*).

Lindsaea doryphora Kramer
Terrestrial herb c. 25 cm tall. Disturbed peat swamp forest, moderate shade, peat soil. S of trail from Tj Belipat along N Park boundary *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S89233.*

DIPTEROCARPACEAE

Dipterocarpus confertus Slooten
Observed in MDF in the SW of the Park.

Dipterocarpus oblongifolius Blume
Large tree 3 m girth, 17 m tall. On riverbank, sandy soil. About 1 km upstream from Kuala Sekaloh of Sg Niah. *Banyeng & Adenan S 22571.*

Dryobalanops beccari Dyer
Observed in MDF on route to G Subis.

Dryobalanops lanceolata Burck
Observed in MDF.

Dryobalanops rappa Becc.
Observed in seasonal swamp forest on peat soils in the N of the Park.

Hopea andersonii Ashton ssp. *andersonii*
Large tree 2 m girth, 33 m tall. On limestone rock near river on S slope of G Subis in Sg Sekaloh, Niah. *Sibat & Adenan S 22566*; G. Subis, Niah, S side near Sg Sekaloh *J.A.R. Anderson S 31645.*

Hopea dryobalanoides Miq.
Tree 2 m girth, 27 m tall. On limestone rock near river on S slope of G Subis in Sg Sekaloh, Niah. *Sibat & Adenan S 22563.*

Hopea pachycarpa (Heim.) Sym.
Tree 2 m girth, 27–37 m tall. On limestone rock near river, also on lower slopes of limestone hill and on limestone boulders on southern slope of G Subis in Sg Sekaloh, Niah. *Sibat & Adenan S 22565; Sonny Tan & E. Wright S 27262.*

Parashorea macrophylla Wyatt-Smith
Observed along Jalan Madu Trail, MDF/*Kerangas* forest.

Shorea agami Wood. ssp. agami
Tree. Lowland poorly drained site. Niah NP. *S.H. Rogstad 725.*

**Shorea falciferoides* Foxw. ssp. *glaucescens Meijer*
G. Subis area, Niah. *Mohidin S 21681.*

**Shorea guiso* (Blanco) Blume
Large tree 2.7 m girth, 37 m tall. Lower slopes of limestone hill, numerous limestone boulders. Southern slopes of G Subis, near Sg Sekaloh *Sonny Tan & E. Wright S 27265.*

**Shorea havilandii* Brandis
Medium-sized tree, 75–120 cm girth, 13–23 m tall. Lower slopes of steep limestone hill, numerous limestone boulders. South side of G Subis, in Sg Sekaloh, Niah *J.A.R. Anderson, Sonny Tan & E. Wright S 27555*; *Sibat & Adenan S 22570.*

**Shorea parvifolia* Dyer
Large tree about 40 m high, 100 cm diam. On relatively steep slope of small river valley in rather open *Dipterocarpus* forest. Limestone area of Bukit Subis to right of Sg Sekalau, to right of footpath from Kuala Sekalau to Bukit Drusau, 120 m asl. *H.P. Fuchs 21275.*

**Shorea patoiensis* Ashton
Tree 15–17 cm girth and 23 m tall. On limestone rock near river, south side of G Subis, in Sg Sekaloh, Niah *Sibat & Adenan S 22567.*

Shorea quadrinervis Slooten.
Observed in MDF in the SW of the Park.

**Vatica chartacea* (Ashton) Kost.
Tree 15 m tall, 45 cm girth. Foot of limestone 17 m asl, G Branging, Ulu Sg Subis, Niah NP. *Yii Puan Ching S 40177.*

**Vatica rynchocarpa* Ashton
Small tree 87 cm girth, 17 m tall. On riverbank, sandy soil. About $^1/_2$ mile upstream from Kuala Sekaloh of Sg Niah *Banyeng & Adenan S 22572.*

Vatica mangachapoi Blanco
Observed in seasonal swamp forest on peat soils in the N of the Park.

DRYOPTERIDACEAE
**Cyclopeltis presliana* J.Sm.
Lithophytic or terrestrial herb 50 cm high. Foot of limestone forest, sandy soil, on limestone cliff also rocks in pockets of mineral soil, medium shade. Ulu Sg Trusan *Jemree Sablee et al. S 89058*; Near Sg Subis *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89458.*

**Heterogonium pinnatum* (Copel.) Holttum
Herb 50 cm tall. Limestone forest on soil on rock on hillside, moderate shade, loamy soil with humus. SW of Telaga Kumang *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89297.*

**Tectaria andersonii* Holttum
Terrestrial fern in shaded localities on limestone outcrop. Upper slopes of limestone hill, 12.5 m below summit ridge, limestone rocks outcropping and deep ‘mor’ soil. Sg Sekaloh, G Subis, Niah *J.A.R. Anderson S 31963*

Tectaria aurita (Sw.) S. Chandra
Collected by H. Schneider (*pers. comm.*).

**Tectaria devexa* (Kunze) Copel.
Lithophytic herb c 25 cm tall. On limestone rocks in pockets of soil between rocks. Medium shade. Beside plank walk to Great Cave *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89478.*

**Tectaria labrusca* (Hook.) Copel.
Herb c. 60 cm tall on rocks. Forest canopy c. 20 m tall, light shade, humus soil among limestone outcrops. Below summit of G Subis *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89437.*

Tectaria subdigitata (Baker) Copel.
Rheophyte. Niah *C. Hose 196* (from Holttum, 1991).

**Tectaria ternata* (Baker) Copel.
Terrestrial. Foot of limestone forest, sandy soil. Ulu Sg Trusan *Jemree Sablee et al. S 89052.*

EBENACEAE
**Diospyros euphlebia* ^{E} Merr.
Tree 3–4 m tall, 3–4 cm diam. Disturbed forest among limestone rocks also foot of limestone hill, light shade. Below W mouth of Great Cave *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89481*; Ulu Sg Tangap *Jemree Sablee et al. S 89073.*

**Diospyros pilosanthera* (Blanco) var. *pilosanthella*
Large tree about 30 m high, 80 cm diam. On steep slope of small river-valley in rather open *Dipterocarpus*-forest. Limestone area of G Subis to right of Sg Sekalau, to right of footpath from Kuala Sekalau to Bukit Drusau, 120 m asl. *H.P. Fuchs 21275.*

Diospyros pyrrhocarpa Miq.
Tree c. 20 m tall, c. 15 cm diam. By path, moderate shade, wet clay soil. Along N Park boundary from Tj Belipat *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89238.*

**Diospyros sumatrana* Miq.
Small tree 3.5–5 m tall, 2–8 cm diam. Dry regenerating peat swamp forest also limestone forest, alluvial, medium shade. *Jemree Sablee et al. S 8904*; Gua Sibau, trail from Rumah Chang, NE of park *Julaihi Abdullah, Kit Pearce et al. S 89322.*

**Diospyros toposia* Ham. var. *toposioides* (King & Gamble) Phengklai
Tree 10 m tall, 5 cm diam. Limestone forest, light shade, humus soil among limestone rocks. Top of limestone summit. *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89405.*

? *Diospyros* sp.
Woody climber [sic] c. 7 m tall, 5 cm diam. Just beside inundated area with standing water, clay soil, moderate shade. Tj Belipat, along boundary 50 m from Sg Niah *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89207.*

ELAEOCARPACEAE
Elaeocarpus stipularis Blume
Shrub about 6 m tall. Riverine forest about 17 m asl, soil loamy. Kuala Sg. Sekaloh, Niah NP *Yii Puan Ching S 40105.*

EUPHORBIACEAE

**Antidesma montanum* Blume

Tree 2–5 m tall, 3 cm diam. Alluvial limestone lowland forest, on limestone cliff also disturbed peat swamp forest, open area by trail, peat soil. Foot of limestone hills from Rumah Chang, Sg Tabau *Julaihi Abdullah, Kit Pearce et al. S 89326*; Along N Park boundary from Tj. Belipat *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89223.*

Antidesma neurocarpum Miq.

Tree 5 m tall, 4 cm diam. Undisturbed MDF, medium shade, loamy soil *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89271.*

Antidesma tomentosum Blume var. *tomentosum*

Small tree 3–7 m tall, 3–10 cm diam. *Emperan* forest, dark brown clay soil also MDF/*kerangas* forest, moderate shade, sandy loam soil. *Jemree Sablee et al. S 89005*; Jalan Madu Trail *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89450.*

Baccaurea sp.

Tree 9 m tall, 18 cm diam. MDF, brown clay soil. Sekaloh *Jemree Sablee et al. S 89012.*

Blumeodendron tokbrai (Blume) Kurz.

Tree 20 m tall, 75 cm girth. Peat swamp forest. Niah NP. *Bernard Lee M.H. S 40065.*

?*Claoxylon*

Treelet 1.5 m tall, 2 cm diam. MDF, Sg Sekaloh *Jemree Sablee et al. S 89035.*

Cleidion javanicum Blume

Tree 7–10 m tall, 15–20 cm diam. Seasonal swamp forest (disturbed) also shady lowland alluvial forest, open area. Beside plank walk to Great Cave *Julaihi Abdullah, Kit Pearce et al. S 89308*; *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89470.*

**Cleistanthus megacarpus* C.B.Rob.

Tree 6–8 m tall, 4–10 cm diam. Alluvial limestone lowland forest also by path, moderate shade, wet clay soil. Foot of limestone hills from Rumah Chang, Sg Tabau *Julaihi Abdullah, Kit Pearce et al. S 89325*; Along N Park Boundary from Tj. Belipat *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89237.*

Croton oblongus Burm.f.

Treelet c. 9 m tall, 18 cm diam. Just beside inundated area with standing water, clay soil, moderate shade. Tj Belipat, along boundary from Sg Niah (200 m from river) *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89204.*

Drypetes microphylla (Merr.) Pax et Hoffm.

Tree 8 m tall, 8 cm diam. MDF/*kerangas* forest, moderate shade, sandy loam soil. Jalan Madu Trail *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89449.*

*?*Erismanthus obliquus* Wall ex Muell.-Arg

Small tree 4–7 m tall, 7–10 cm diam. Limestone forest, light shade, humus soil amongst limestone rocks. G Subis *Jemree Sablee et al. S 89043*; Top of limestone summit *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89401.*

**Macaranga endertii* Whitmore
Tree 35 cm girth, 15 m high. Lower slopes of limestone hill, numerous limestone boulders. S slopes of G Subis, near Sg Sekaloh. *Sonny Tan & E. Wright, S 27275.*

Mallotus floribundus (Blume) Muell.-Arg.
Tree 6–10 m tall, 3–17 cm diam. Just beside inundated area with standing water, clay soil, moderate shade also seasonal swamp forest (disturbed), light shade, clay soil, beside water channel. Tj Belipat, along boundary from Sg Niah *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89206*; Trail into park from Kuala Sg Subis *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89289.*

**Mallotus miquelianus* (Scheff.) Boerl.
Treelet 2 m tall, 1.5 cm diam. Limestone forest among rocks on hillside, moderate shade, loamy soil with humus. SW of Telaga Kumang *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89295.*

**Wetria insignis* (Steud.) Airy Shaw
Tree 20 m tall, 4 cm diam. Limestone forest, light shade, humus soil amongst limestone rocks. Top of limestone summit. *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89403*

*Euphorbiaceae sp.
Tree 4 m tall, 2 cm diam. On humus soil among limestone outcrops. Below summit of G Subis *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89434.*

FABACEAE (PAPILIONOIDEAE)
Canavalia cathartica Thouars
Semi-woody plant to 0.5 m tall. Shady lowland alluvial forest. Along plank walk to Niah Caves *Julaihi Abdullah, Kit Pearce et al. S 89310.*

Copaeifera palustris (Sym.) de Wit
Observed in seasonal swamp forest on peat soils in the N of the Park.

Koompassia excelsa (Becc.) Taubert
Observed in MDF on route to G Subis.

Ormosia sumatrana (Miq.) Prain
Observed on the summit of Bukit Kasut.

FAGACEAE
Lithocarpus blumeanus (Korth.) Rehder
Observed in forest transitional between riverine and seasonal swamp forest.

Lithocarpus gracilis (Korth.) Soepadmo
Tree *c.* 25 m tall, 45 cm diam. Seasonal swamp forest (disturbed), light shade, clay soil. Trail into park from Kuala Sg Subis *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89288.*

Lithocarpus sp.
Tree c. 5 m tall, 15 cm diam. Disturbed peat swamp forest, moderate shade, peat soil. S of trail from Tj Belipat along the N boundary of Niah NP. *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89228.*

FLACOURTIACEAE

Casearia grewiifolia Vent.var. *gelonioides* (Bl.) Sleumer
Treelet 2 m tall, 1.5 cm diam. Disturbed peat swamp forest, open area by trail, peat soil. Along N Park Boundary from Tj Belipat *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89218.*

Hydnocarpus gracilis (Sloot.) Sleum.
Tree 20 m tall, 45 cm diam. MDF, Sg Sekaloh *Jemree Sablee et al. S 89029.*

GESNERIACEAE

**Aeschynanthus tricolor* Hook.
Epiphyte. On trees on swampy alluvial soils at base of limestone hill, subject to periodic inundation. On southern slopes of G Subis in Sg Sekaloh, Niah *J.A.R. Anderson, Sonny Tan & E. Wright S 26086.*

**Aeschynanthus* cf. *tricolor* Hook.
Herbaceous climber c. 10 m up on trunk of tree. Limestone forest (disturbed including by logging), on exposed rocks, shady area, soil peaty humus between rocks. S boundary of Park, E of Quarry *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89494.*

**Aeschynanthus parvifolius* R.Br.
Epiphytic on tree. Foot of limestone hill, Great Cave *Jemree Sablee et al. S 89065.*

**Cyrtandra bracheia* B.L.Burtt
Shrublet 45–60 sm high. Broad sloping ravine between two vertical limestone hills, numerous limestone boulders, some residual soil (very localized). On southern slopes of G Subis in the Sg Sekaloh, Niah *J.A.R. Anderson, Sonny Tan & E. Wright S 26092.*

**Cyrtandra cretacea*^{E} Kraenzl.
On rough limestone rocks just before reaching caves. Niah Caves *B.L. Burtt & P.J.B. Woods B 1991; Haviland & Hose 3530.*

Cyrtandra erectipila B.L.Burtt
Herb 30 cm tall, 1 cm diam. MDF. Sg Sekaloh *Jemree Sablee et al. S 89033.*

**Cyrtandra incrustata*^{E} B.L.Burtt
Solitary herb or small shrublet 15–22 cm tall. In limestone forest on exposed rocks, medium shade also base of limestone cliff, somewhat dry and shaded at 100 m altitude. S boundary of the Park, E of Quarry *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89496;* South side of G Subis, in Sg Sekaloh, Niah *J.A.R. Anderson, Sonny Tan & E. Wright S 27575.*

**Cyrtandra oblongifolia* (Blume) C.B.Clarke
Epiphytic shrub. In limestone forest on rocks, medium shade, also on limestone rock at 50 m altitude. S Boundary of park, E of Quarry *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89499;* Valley in front of Niah Caves *B.L. Burtt & P.J.B. Woods B 2037;* Ulu Sg Subis, Niah NP *Bernard Lee S 40083.*

**Cyrtandra spelaea*^{E} B.L.Burtt
Prostrate herb or shrublet 60–90 cm tall. Back of shallow cave, base of cave wall, somewhat dry and completely shaded, slopes of limestone hill immediately below cliff *c* 130 m altitude,

litter layer overlying limestone boulders, abundant on vertical limestone rock face. Niah Cave *B.L. Burtt & P.J.B. Woods B 2018 & B 3020* and *Alphonso & Samsuri A 239;* Sg Sekaloh, G Subis *J.A.R. Anderson S 31958;* Great Cave *J.A.R. Anderson S 31918;* Inside Niah Cave on rock *Ahmad 11;* Niah *Haviland & Hose 3531; Synge 615.*

**Cyrtandra trisepala* C.B.Clarke
Herb or shrublet 85 cm tall. On limestone rocks and pavement, gully between limestone hill, heavily dissected, mineral soil very sparse. G Subis *J.A.R. Anderson S 31671.*

**Cyrtandra tubiflora* Kraenzl.
On bare limestone, shaded. Valley below main Niah Cave *B.L. Burtt & P.J.B. Woods B 2015.*

**Epithema sarawakensis* Hill & B.L.Burtt
Herb. Limestone forest on stone, G Subis *Jemree Sablee et al. S 89048.*

Henckelia cf violoides (C.B.Clarke) B.L.Burtt
Niah. *Haviland & Hose 3534.*

**Monophyllaea merrilliana* Kraenzl.
Herb. Infrequent on damp limestone rock in deep shade *Kit Pearce & Narawi Johari S 78595.*

**Paraboea speluncarum* (B.L.Burtt) B.L.Burtt
Herb or shrublet. Cave and large overhang 100 m up on steep limestone hill, light dry soil, partly composed on guano, also forest. Gua Pangomah, G. Subis, *Niah J.A.R.Anderson S 31675;* Niah Caves *Alphonso & Samsuri 241.*

Paraboea sp. nov.
Large herb 75–120 cm tall. On bare, exposed limestone rock near summit of limestone pinnacles or crest of limestone hill, 'mor' soil, 130 m asl, Niah *J.A.R. Anderson S 16045;* S slope of G Subis near Sg Sekaloh *Sonny Tan & E. Wright S 27279.*

GNETACEAE
Gnetum gnemon L.
Tree 5 m tall, 2 cm diam. Disturbed secondary forest, moderate shade, clay soil. Along N Park boundary from Tj. Belipat *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89215.*

**Gnetum leptostachyum* Blume
Woody climber 10 m tall, 2.5 cm diam. Limestone forest among rocks on hillside, moderate shade, loamy soil with humus. SW of Telaga Kumang *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89298.*

Gnetum neglectum Blume
Woody climber or liana at least 10 m tall, 2 cm diam. Secondary forest, moderate shade, loam soil under 15 cm humus, moderate shade. Close to Sg Niah *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89259 & S 89246.*

HANGUANACEAE
Hanguana malayana (Jack) Merr.
Herb 1 m tall. Disturbed swamp forest, in standing water, moderate shade, grey clay with wet humus layer. Close to Sg Niah *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89242.*

ICACINACEAE

Gonocaryum macrophyllum (Blume) Sleumer
Treelet 4 m tall, 2.5 cm diam. Secondary forest, moderate shade, loam soil. Close to Sg Niah *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89245.*

Stemonurus secundiflorus var. *lanceolatus*
Tree 15 m tall, 10 cm diam. Disturbed peat swamp forest, open area by trail, peat soil. Along N Park boundary from Tj Belipat *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89226.*

LAURACEAE

**Dehaasia brachybotrys* (Merr.) Kosterm.
Tree 5 m tall, 5 cm diam. Foot of limestone hill. Ulu Sg Tangap *Jemree Sablee et al. S 89076.*

Eusideroxylon zwageri Teijsm. & Binn.
Cut stumps observed in alluvial habitats, on hills and in damp valley.

Litsea ?oppositifolia (Blume) Vill.
Tree c. 6 m tall. Just beside inundated area with standing water, clay soil, moderate shade. Tj Belipat, along boundary from Sg Niah *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89210.*

Litsea sp. 1
Treelet 2 m tall, < 1 cm diam. Disturbed peat swamp forest, open area by trail, peat soil. Along N Park boundary from Tj Belipat *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89220.*

**Litsea* sp. 2
Tree 3 m tall, 1.5 cm diam. Limestone forest, alluvial, medium shade. Gua Sibau, trail from Rumah Chang, NE of Park. *Julaihi Abdullah, Kit Pearce et al. S 89317.*

Lauraceae sp. 1
Treelet 1.5 m tall, 1 cm diam. Dry regenerating peat swamp forest *Jemree Sablee et al. S 89039.*

Lauraceae sp. 2
Small tree 3 m tall, 4 cm diam. MDF, brown clay soil. Sekaloh *Jemree Sablee et al. S 89013.*

Lauraceae sp. 3
Small tree 5 m tall, 7 cm diam. MDF, brown clay soil. Sekaloh *Jemree Sablee et al. S 89016.*

LOGANIACEAE

**Fagraea* sp.
Tree 2 m tall, 3 cm diam. Exposed limestone rocks with humus soil around, summit of G Subis *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89420.*

LOMARIOPSIDACEAE

Bolbitis heteroclita (C. Presl) Ching
Herb 30 cm tall. Disturbed seasonal swamp forest, light shade, grey clay soil. Sg Subis *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89294*

LYCOPODIACEAE
Huperzia phlegmaria (L.) Rothm.
Herbaceous epiphyte *c.* 1.5 m long. Seasonal swamp forest (disturbed), light shade, clay soil. Trail into Park from Kuala Sg Subis *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89283.*
MARANTACEAE
Schumannianthus sp. nov.
Clustering herb 1 m tall. MDF, light shade, loam soil. Across river from Park HQ *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89442.*

MELASTOMATACEAE
**Medinilla botryocarpa* ^{E} Regalado
Woody shrub 1 m tall. Exposed limestone rocks with humus soil, summit of G Subis *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89419.*

Medinilla crassifolia (Reinw. ex Blume) Blume
Semi-woody epiphyte 3.5 m up tree. MDF/*kerangas* forest, moderate shade, sandy loam soil. Jalan Madu Trail *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89448.*

Memecylon paniculatum Jack
Tree 6 m tall, *c.* 3 cm diam. Disturbed secondary forest, light shade, clay soil. Along N Park Boundary from Tj Belipat *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89214.*

Pternandra cf. *crassicalyx* Maxwell
Tree 6 m tall, *c.* 4 cm diam. Secondary forest, moderate shade, loam soil. Close to Sg Niah *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89253.*

MELIACEAE
* *Aglaia korthalsii* Miq.
Tree 10 m tall, 10 cm diam. Forest on humus soil among limestone outcrops. Below summit of G Subis *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89435.*

**Aglaia simplicifolia* (Bedd.) Harms
Small tree 4 m tall, 5 cm diam. Foot of limestone forest, sandy soil. Ulu Sg Trusan *Jemree Sablee et al. S 89051.*

Chisocheton polyandrus Merr.
Small tree 5 m tall, 4 cm diam. MDF, brown clay soil. Sekaloh *Jemree Sablee et al. S 89021.*

Dysoxylum excelsum Blume
Tree 10 m tall, 13 cm diam. *Emperan* forest, dark brown clay soil *Jemree Sablee et al. S 89001.*

Dysoxylum oppositifolium F.Muell.
Small tree 2 m tall, 6 cm diam. MDF, Sg Sekaloh *Jemree Sablee et al. S 89027.*

MENISPERMACEAE
?*Parabaena hirsuta* (Becc.) Diels
Herbaceous climber, twining to 6 m tall. Seasonal swamp forest (disturbed), light shade, clay soil. Trail into the Park from Kuala Sg Subis *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89286.*

MONIMIACEAE
**Matthaea sancta* Blume
Small tree 4 m tall, 7 cm diam. Foot of limestone forest, sandy soil. Ulu Sg Trusan *Jemree Sablee et al. S 89054.*

MORACEAE
Antiaris toxicaria Lesch.
Photographed in MDF.

Artocarpus odoratissimus Blanco
Observed behind the banks of Sg Niah.

**Ficus deltoidea* Jack var. *deltoidea*
Woody shrub 70 cm tall or epiphyte. Dry limestone forest, open, with litter and exposed limestone rocks with humus soil around, open. Limestone hill next to Quarry *Julaihi Abdullah, Kit Pearce et al. S 89311*; Summit of G Subis *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89416.*

**Ficus depressa* Blume
Epiphyte or huge strangler to 4 m tall, 20 cm diam. Limestone forest or shady lowland alluvial forest. Ulu Sg Sekaloh, near Quarry *Jemree Sablee et al. S 89070*; Limestone hill next to Quarry *Julaihi Abdullah, Kit Pearce et al. S 89316.*

**Ficus hemselyana* ^{E} King
Lithophytic shrub c. 2 m tall, 1.5 cm diam at base. Disturbed forest among limestone rocks, light shade also in limestone forest on exposed rocks, medium shade. Below W mouth of Great Cave *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89488*; S Boundary of Park, E of Quarry *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89497.*

Ficus obscura Blume var. *lanata* Kochummen
Epiphytic tree c. 4 m tall, 3 cm diam. about 4 m from ground on large tree. Seasonal swamp forest (disturbed), light shade. Beside plank walk to Great Cave *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89465.*

**Ficus subulata* Blume
Shrub sprawling to *c.* 4 m or much branched lithophytic climber at least 10 m tall, *c.* 5 cm diam at base. On limestone rocks in pockets of mineral soil, medium shade. Near Sg Subis *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89455;* Beside plank walk to Great Cave *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89477.*

**Ficus sumatrana* (Miq.) Miq.
Woody shrub 1 m tall. Exposed limestone rocks with humus soil, summit of G Subis *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89415.*

**Ficus tinctoria* G.Forst. var. *gibbosa* (Blume) Corner
Shrubby epiphyte to 1 m long. Shady lowland alluvial forest, limestone hill next to Quarry *Julaihi Abdullah, Kit Pearce et al. S 89312.*

Ficus sp.
Epiphyte. Dry regenerating peat swamp forest *Jemree Sablee et al. S 89038.*

**Streblus macrophyllus*^{E} Blume
Small tree 1.5–2.5 m tall, 1–5 cm diam. Foot of limestone hill also on limestone rocks in forest at base of limestone crags, light shade, stony mineral soil. Ulu Sg Tangap. *Jemree Sablee et al.* (S 89075); At base of limestone crags *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89274.*

MYRISTICACEAE
Knema glauca (Blume) Peterman
Tree 12 m tall, 20 cm diam. MDF, brown clay soil. Sekaloh *Jemree Sablee et al. S 89023.*

**Myristica guatteriifolia* A.DC.
Tree 20 m tall, 30 cm diam. Summit of limestone hill, light shade, with loose limestone rocks and humus soil. SW of Telaga Kumang *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89299.*

MYRSINACEAE
Ardisia sanguinolenta Blume
Small tree 5–7 m tall, 4–12 cm diam. *Emperan* forest, dark brown clay soil *Jemree Sablee et al. S 89003 & S 89007.*

Labisia pumila Benth. & Hook.f.
Herb 35 cm tall. Disturbed peat swamp forest, open area by trail, peat soil. Along N Park boundary from Tj Belipat *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89227.*

**Systellantha brookeae* Stone
Treelet 1–2.5 m tall, 1–1.5 cm diam or shrub *c.* 40 cm tall. By path, moderate shade, wet clay soil also foot of limestone hill, also limestone forest (disturbed, including by logging) on exposed rocks, light shade, soil peaty humus between rocks. Along N Park boundary from Tj Belipat *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89239*; Ulu Sg Tangap. *Jemree Sablee et al. S 89071*; S Boundary of park, E of Quarry *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89493.*

MYRTACEAE
**Syzygium hirtum* Korth.
Tree 14 m tall, 20 cm diam. Shady lowland alluvial forest. Limestone hill next to Quarry *Julaihi Abdullah, Kit Pearce et al. S 89314.*

Syzygium sp. 1
Tree *c.* 10 m tall, 20 cm diam. Disturbed peat swamp forest, moderate shade, peat soil. S of trail from Tj Belipat along N Park boundary. *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89229.*

**Syzygium* sp. 2
Tree 3 m tall, 3 cm diam. Exposed limestone rocks with humus soil around, summit of G Subis *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89417.*

**Syzygium* sp. 3
Small tree 2 m tall, 5 cm diam. Foot of limestone forest, sandy soil. Ulu Sg Trusan *Jemree Sablee et al. S 89055.*

**Syzygium* sp. 4
Small tree 3 m tall, 3 cm diam. Foot of limestone hill. Great Cave *Jemree Sablee et al. S 89066.*

**Syzygium* sp. 5
Tree 6 m tall, 7 cm diam. Foot of limestone hill. Ulu Sg Tangap *Jemree Sablee et al. S 89074.*

**Syzygium* sp. 6
Tree 7 m tall, 6 cm diam. Forest on humus soil among limestone outcrops, below summit of G Subis *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89433.*

Syzygium sp. 7
Tree 12 m tall, 80 cm diam. Secondary forest, loam soil under 15 cm humus, moderate shade. Close to Sg Niah *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89261.*

NEPENTHACEAE
Nepenthes mirabilis (Lour.) Druce
Climber 4 m long. Disturbed forest, grey clay under 25 cm peat, light shade. Close to Sg Niah *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89254.*

OPHIOGLOSSACEAE
Helminthostachys zeylanica (L.) Hook.
Terrestrial fern, 40 cm tall. On rock near river. Sg Sekaloh *Jemree Sablee et al. S 89037.*

ORCHIDACEAE
**Adenoncos triloba* ^{E}Carr
Epiphyte. Lowland limestone hills at 300 m altitude. Niah *Synge S 603.* (from Beaman *et al.*, 2001).

**Agrostophyllum glumaceum* Hook.*f.*
Epiphytic herb *c.* 2.5 cm tall, *c.* 2.5 cm up woody liana. Limestone forest, alluvial, medium shade. Gua Sibau, trail from Rumah Chang, NE of Park *Julaihi Abdullah, Kit Pearce et al. S 89323.*

**Agrostophyllum* sp.
Epiphyte. Exposed limestone rocks and humus soil, just below summit of G Subis *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89432.*

**Anoectochilus* sp.
Terrestrial jewel orchid photographed by trail to Bukit Kasut.

**Appendicula* cf. *anceps* Blume
Herb 30 cm tall. Foot of limestone forest, sandy soil. Ulu Sg Trusan *Jemree Sablee et al. S 89060.*

**Appendicula* cf. *uncata* Ridley ssp. *sarawakensis* J.J. Wood
Herb 25 cm tall or epiphytic. Disturbed peat swamp forest, moderate shade, peat soil also exposed limestone rocks with humus soil around, open. S of trail from Tj Belipat along N Park boundary. *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89232:* Summit of G Subis *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89422.*

**Appendicula* sp.
Epiphyte. Disturbed forest among limestone rocks, light shade. Below W mouth of Great Cave *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89489.*

**Bulbophyllum* cf. *acutum* J.J.Sm.
Epiphyte. Limestone forest, alluvial, medium shade. Gua Sibau, trail from Rumah Chang, NE of Park *Julaihi Abdullah, Kit Pearce et al. S 89320.*

**Bulbophyllum minutulum* Ridley
Epiphyte. On limestone. Niah *Vermeulen LC 26546* (from Beaman *et al.* 2001).

**Bulbophyllum vaginatum* (Lindl.) Rchb.f.
Epiphyte. G Subis, 50 m *Vermeulen 1171* (from Beaman *et al.* 2001).

Calanthe triplicata (Willemet) Ames
Terrestrial. G Subis *J.A.R. Anderson S 31668;* Niah, 300 m *Burtt & Woods B 2031;* Niah. *Synge, S. 577.* (from Beaman *et al.* 2001).

**Calanthe* cf. *triplicata* (Willemet) Ames
Lithophytic herb 80 cm tall. On limestone rocks in forest at base of limestone crags, light shade, stony mineral soil *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89270.*

**Calanthe* sp.
Herb 50 cm tall. Limestone forest. G Subis *Jemree Sablee et al. S 89050.*

Claderia viridiflora Hook.f.
Terrestrial. Observed by path from Pengkalan Lobang to Great Caves.

**Cleisostoma* or *Pomatocalpa* sp.
Herb creeping on rock. Exposed limestone rocks with humus soil, summit of G Subis *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89414.*

Coelogyne verrucosa S.E.C. Sierra
Epiphyte. Niah 10–300m *Vermeulen LC 26555* (from Beaman *et al.* 2001).

Coelogyne pandurata Lindl.
Epiphyte. G Subis *Mohidin S 21682* (from Beaman et al. 2001).

Didymoplexiella borneensis E (Schltr.) Garay
Saprophyte. G Subis *Sonny Tan & Wright S 27273* (from Beaman *et al.* 2001).

**Dossinia marmorata* E E.Morren
Small terrestrial orchid. On moss on exposed limestone rocks and humus soil, also in shade near base of limestone hill. Just below summit of G Subis *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89425;* Niah *J.A.R. Anderson S 16025.*

**Eria* (Sect. *Cylindrolobus*) aff. *leptocarpa* Hook.f.
Epiphyte. Disturbed forest among limestone rocks, light shade. Below W mouth of Great Cave *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89480.*

**Eria* sp.
Epiphyte. MDF, below limestone, moderate shade, loamy soil. Abundant. At base of limestone crags *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89278.*

**Liparis* cf. *gibbosa* Finet
Epiphyte. Exposed limestone rocks and humus soil. Just below summit of G Subis *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89426.*

**Liparis elegans* Lindl.
Epiphytic herb c. 20 cm tall. Exposed limestone rocks with humus soil. Summit of G Subis *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89424.*

**Liparis* cf. *grandiflora* Ridley
Epiphyte. Disturbed forest among limestone rocks, light shade. Below W mouth of Great Cave *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89483.*

Liparis wrayi Hook.*f.*
Terrestrial herb 20 cm tall. By path, moderate shade, wet clay soil. Along N Park boundary from Tj Belipat *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89240.*

Malaxis andersonii (Ridl.) Ames
Terrestrial. Niah *Synge S 599 (*from Beaman *et al.* 2001).

Plocoglottis borneensis Ridl.
Terrestrial orchid in forest. Niah *Ahmad 45.* G Subis *Mohidin S 21678* (from Beaman *et al.* 2001).

Plocoglottis cf. *borneensis* Ridl.
Terrestrial herb 40 cm tall. Disturbed swamp forest, in standing water, moderate shade, grey clay with wet humus layer. Close to Sg Niah *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89265.*

**Podochilus* cf. *serpillifolius* (Blume) Lindl.
Epiphyte. Exposed limestone rocks with humus soil, summit of G Subis *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89423.*

Thecostele alata (Roxb.) C.S.P.Parish
Herbaceous epiphyte. MDF/*kerangas* forest, moderate shade, sandy loam soil. By Sg Subis, Jalan Madu Trail *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89451.*

OXALIDACEAE
**Oxalis corniculata* L.
Lithophytic herb creeping on limestone rock. Limestone forest, moderate shade, beside plank walk to Great Cave *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89475.*

PANDANACEAE
**Freycinetia rigidifolia* Hemsley
Shrub 1 m tall. On 'mor' layer on summit of sharp limestone hill. G Subis, Niah 130 m. *J.A.R. Anderson S 16426.*

Pandanus basilocularis Martelli
Observed along plank walk to Painted Cave.

Pandanus calcinactus St John *ex* Stone
Observed just below the summit of G Subis.

PASSIFLORACEAE
Adenia macrophylla (Bl.) Koord. var. *smilacina* (Hall.f.) deWilde
Woody climber 7 m tall, c. 1 cm diam. Disturbed *emperan* forest, by path in open area, clay soil. Tj Belipat, along boundary from Sg Niah (50 m from river) *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89201.*

PIPERACEAE
Piper caninum Blume
Semi-woody climber 1.5 m tall. Disturbed peat swamp forest, open area by trail, peat soil. Along N Park boundary from Tj. Belipat *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89221.*

Piper muricatum Blume
Herb c. 30 cm tall. Well-developed secondary forest by stream, moderate shade, alluvial soil. Close to Sg Niah *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89262.*

Piper sarmentosum Roxb. ex Homem.
Sprawling herb c. 60 cm tall. Disturbed seasonal swamp forest, light shade, grey clay soil. Sg Subis *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89292.*

**Piper ?stylosum* Miq.
Climber up to 1.5 m high on small tree. Foot of limestone forest, sandy soil. Ulu Sg Trusan *Jemree Sablee et al. S 89053.*

**Piper* aff. *vestitum* C.DC.
Erect herb 25–50 cm tall. Limestone forest, light shade, humus soil amongst limestone rocks, also on limestone rocks in forest at base of limestone crags, light shade, stony mineral soil and top of limestone summit *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89407;* At base of limestone crags *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89276.*

Piper sp. 1
Herbaceous climber 1.2 m tall. Disturbed forest, grey clay under 25 cm peat, moderate shade. Close to Sg Niah *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89255.*

Piper sp. 2
Herbaceous climber, *c.* 2 m tall. Disturbed seasonal swamp forest, light shade, grey clay soil. Sg Subis *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89293.*

Piper sp. 3
Climber on tree. MDF. Sg Sekaloh *Jemree Sablee et al. S 89028.*

Piper sp. 4
Shrub 1.5 m tall. Secondary forest, moderate shade, loam soil. Close to Sg Niah *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89243.*

POACEAE
Schizostachyum or *Bambusa*
Bamboo to 3 m tall, 3 cm diam. Shady lowland alluvial forest. Along plank walk to Niah Caves. *Julaihi Abdullah, Kit Pearce et al S 89303.*

PODOCARPACEAE
**Podocarpus confertus* deLaubenfels
Tree 10 m tall, 12 cm dbh. Exposed limestone rocks and humus soil, just below summit of G Subis *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89428.*

POLYPODIACEAE
Microsorium linguiforme (Mett.) Copel.
Epiphyte. Shady lowland alluvial forest. Along plank walk to Niah Caves *Julaihi Abdullah, Kit Pearce et al. S 89302.*

**Paragramma longifolia* (Blume) T. Moore
Epiphyte *c.* 40 cm tall. Exposed limestone rocks and humus soil, just below summit of G Subis *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89431.*

**Phymatosorus nigrescens* (Blume) Pic.Serm.
Lithophytic herb 1 m tall. Limestone forest, moderate shade, on limestone rock. Beside plank walk to Great Cave *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89473.*

**Pyrrosia lanceolata* (L.) Farw.
Epiphyte. Foot of limestone forest, sandy soil. Ulu Sg Trusan *Jemree Sablee et al. S 89057.*

RUBIACEAE
*?*Timonius*
Shrub 1 m tall. Limestone forest (disturbed, including by logging) on exposed rocks, shady area, soil peaty humus between rocks. S Boundary of Park, E of Quarry *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89500.*

Acranthera cf. *involucrata* Val.
Herb 30–150 cm tall, 1 cm diam. MDF, also secondary forest, moderate shade, loam soil. Sg Sekaloh *Jemree Sablee et al. S 89032*; Close to Sg Niah *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89244.*

Anthocephalus cadamba (Roxb.) Miq.
Vegetation verification plot specimen in seasonal swamp forest on gley soils.

Cephaelis stipulacea Blume
Treelet 1 m tall, 0.8 cm diam. MDF, brown clay soil. Sekaloh *Jemree Sablee et al. S 89009.*

Geophila repens (L.) Johnston
Creeping herb. Seasonal swamp forest (disturbed), by path, light shade, clay soil. Along Jalan Madu Trail *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89490.*

Lasianthus constrictus Wight
Treelet 1 m tall. MDF, brown clay soil. Sekaloh *Jemree Sablee et al. S 89015.*

Lasianthus stipularis Blume
Treelet 2.5 m tall, 1.5 cm diam. Seasonal swamp forest (disturbed), light shade, clay soil. Trail into park from Kuala Sg Subis *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89287.*

**Mussaenda* sp.
Herbaceous climber 3 m long. Exposed limestone rocks with humus soil, summit of G Subis *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89421.*

**Ophiorrhiza* sp.
Herb to 25 cm tall. Dry limestone forest, open, with litter. Limestone hill next to Quarry *Julaihi Abdullah, Kit Pearce et al. S 89315.*

Pavetta indica L.
Treelet 2–4 m tall, < 1–2.5 cm diam. Disturbed forest, grey clay under 25 cm peat, moderate shade also disturbed, regenerating *emperan* forest, light shade, alluvial soil. Close to Sg Niah *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89256*; Kuala Sg Subis *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89281.*

Psychotria cf. *aurantiaca* Blume
Shrub or treelet 70–100 cm tall. *Emperan* forest, dark brown clay soil also just beside inundated area with standing water, clay soil, moderate shade. *Jemree Sablee et al. S 89004*; Tj Belipat, along boundary 50 m from Sg Niah *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89205.*

**Psychotria* cf. *obovata* Wall.
Herbaceous climber to 1 m tall. Exposed limestone rocks and humus soil, just below summit of G Subis. *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89427.*

Saprosma arborea Blume
Treelet 4 cm diam. Disturbed secondary forest, moderate shade, clay soil. Along N Park Boundary from Tj Belipat *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89213.*

Tarenna aff. *costata* Val.
Treelet 1.5 m tall. MDF, brown clay soil. Sekaloh *Jemree Sablee et al. S 89022.*

Urophyllum hirsutum Wight
Tree 3 m tall or shrub 1.5 m tall, 1.5 cm diam. Disturbed MDF, light shade, grey clay soil with humus 5 cm deep (locally abundant), also *emperan* forest, dark brown clay soil. Close to Sg Niah *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89249; Jemree Sablee et al. S 89002.*

RUTACEAE
**Micromelon minutum* (G. Forst) Wight & Arn.
Tree c. 6 m tall, c. 5 cm diam. Disturbed forest among limestone rocks, light shade. Below W mouth of Great Cave *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89484.*

SAPINDACEAE
Allophyllus cobbe (L.) Raeuschel
Leaning treelet 4 m tall, 3 cm diam. Seasonal swamp forest (disturbed), light shade, clay soil. Trail into Park from Kuala Sg Subis *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89285.*

**Lepisanthes falcata* (Radlk.) Leenh.
Treelet 7 m tall, 5 cm diam. Limestone forest among rocks on hillside, moderate shade, loamy soil with humus. SW of Telaga Kumang *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89300.*

**Lepisanthes tetraphylla* (Vahl) Radlk.
Tree 2 m tall, 2 cm diam. In limestone forest at summit on exposed rocks, medium shade. S boundary of Park, E of Quarry *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89498.*

Nephelium sp.
Tree 7 m tall, 1.5 cm diam. MDF, brown clay soil. Sekaloh *Jemree Sablee et al. S 89011.*

Pometia pinnata J.R. Forst. & G.Forst.
Observed along riverbanks.

?Sapindaceae
Small tree 4 m tall, 6 cm diam. MDF Sg Sekaloh *Jemree Sablee et al. S 89030.*

SAURAUIACEAE
Saurauia sp.
Tree to 2 m tall, 4 cm. diam. Shady lowland alluvial forest. Along plank walk to Niah Caves *Julaihi Abdullah, Kit Pearce et al. S 89306.*

STERCULIACEAE
Leptonychia caudata (Wall. ex G.Don) Burret
Small tree 3 m tall, 4 cm diam. MDF, brown clay soil. Sekaloh *Jemree Sablee et al. S 89010.*

Pterospermum subpeltatum C.B. Rob.
Vegetation verification plot specimen in seasonal swamp forest on gley soils.

Sterculia aff. *coccinea* Jack
Small tree. Seasonal swamp forest (disturbed), open area. Beside plank walk to Great Cave *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89471.*

Sterculia rubiginosa Vent.
Tree *c.* 11 m tall, 25 cm diam. Disturbed, regenerating *emperan*, light shade, alluvial soil. Kuala Sg Subis *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89280.*

Sterculia stipulata Korth.
Tree 4 m tall, c. 3 cm diam. Seasonal swamp forest (disturbed), light shade by stream. Beside plank walk to Great Cave *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89466.*

**Sterculia rubiginosa* or *stipulata*
Treelet 6 m tall, 5 cm diam. Disturbed forest among limestone rocks, light shade. Below W mouth of Great Cave *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89482.*

?Sterculia
Small tree 7 m tall, 5 cm diam. MDF, Sg Sekaloh *Jemree Sablee et al. S 89026.*

THELYPTERIDACEAE

Mesophlebion oligodictyon (Baker) Holltum
Niah *C. Hose 1341.*

TILIACEAE

Grewia aff. *pearsonii* (Merr.) Burret
Tree 2.5 m tall, 1.5 cm diam. MDF, below limestone, loamy soil. At base of limestone crags *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89277.*

Shoutenia glomerata King
Observed growing gregariously along Sg Subis along Jalan Madu Trail.

URTICACEAE

**Elatostema acuminata* (Poir.) Brongn.
Creeping terrestrial herb c. 20 cm tall. Limestone forest on stones and humus on top of rock in secondary seasonal swamp forest. G Subis *Jemree Sablee et al. S 89047*; Trail into park from Kuala Sg Subis *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89291*
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Elatostema sp.
Herb 25 cm tall. Secondary forest, loam soil under 15 cm humus, moderate shade. Close to Sg Niah *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89260.*

**Oreocnide trinervis* (Wedd.) Miq.
Small tree 4–5 m tall, 4–5 cm diam. Limestone forest, light shade, humus soil amongst limestone rocks. Ulu Sg Sekaloh, near Quarry *Jemree Sablee et al. S 89067*; Top of limestone summit *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89402.*

?*Pilea* sp. 1
Sprawling herb *c.* 30 cm tall. Disturbed peat swamp forest, moderate shade, peat soil. S of trail from Tj Belipat along N boundary of Niah N.P. *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89231.*

?*Pilea* sp. 2
Semi-woody plant c. 20 cm high. Disturbed peat swamp forest, open area by trail, peat soil. Along N Park boundary from Tj Belipat *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89224.*

*Urticaceae sp. 1
Creeping herb. Foot of limestone hill, on rock. Great Cave *Jemree Sablee et al. S 89063.*

*Urticaceae sp. 2
Creeping herb. Forest canopy c. 20 m tall, light shade, humus soil among limestone outcrops, on loose soil below wall of limestone. Below summit of G Subis *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89439.*

*Urticaceae sp. 3
Terrestrial herb. Limestone forest. G Subis *Jemree Sablee et al. S 89044.*

*Urticaceae sp. 4
Lithophytic herb. Limestone forest (disturbed, including by logging) on exposed rocks,

shady area, soil peaty humus between rocks. S boundary of park, E of Quarry *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89492.*

*Urticaceae sp. 5
Herb 35 cm tall. MDF, Sg Sekaloh *Jemree Sablee et al. S 89025.*

*Urticaceae sp. 6
Herb c. 30 cm tall. On limestone rocks, light shade, almost no soil. Near Sg Subis *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89462.*

VERBENACEAE
**Clerodendrum* sp.
Semi-woody plant 25 cm tall. On limestone rocks in pockets of soil between rocks, medium shade. Beside plank walk to Great Cave *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89479.*

*Verbenaceae sp.
Woody herb 30 cm tall. Foot of limestone hill. Great Cave *Jemree Sablee et al. S 89064.*

VIOLACEAE
**Rinorea bengalensis* (Wall.) O.K.
Treelet 2.5 m tall, 2 cm diam. Limestone forest among rocks on hillside, moderate shade, loamy soil with humus. SW of Telaga Kumang *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89296.*

**Rinorea horneri* (Korth.) O.K.
Small tree 1.5–5 m tall, 3–8 cm diam. Limestone forest. G Subis *Jemree Sablee et al. S 89045;* Ulu Sg Sekaloh, near Quarry *Jemree Sablee et al. S 89068.*

VISCACEAE
Ginalloa falcata Dans.
Hemi-parasitic shrub on branch. Seasonal swamp forest (disturbed), open area. Beside plank walk to Great Cave *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89468.*

VITACEAE
*?*Cayratia* sp. 1
Herbaceous creeping scrambler 2 m long. Exposed limestone rocks with humus soil, summit of G Subis *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89418.*

*?*Cayratia* sp. 2
Semi-woody climber c. 10 m tall, 1 cm diam. Limestone forest, light and moderate shade, humus soil amongst and climbing over limestone rocks. Top of limestone summit of G Subis *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89406*; Beside plank walk to Great Cave *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89476.*

*?*Cayratia* sp. 3
Creeping herb. Limestone forest. Moderate shade on limestone rock. Beside plank walk to Great Cave *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89474.*

Cissus cf. *angustata* Ridley
Semi-woody climber c. 5 m tall. MDF, light shade, loam soil. Across river from Park HQ *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89443.*

Pterisanthes polita (Miq.) Lawson
Herbaceous climber 1.5 m long. MDF, light shade, loam soil. NE of Kuala Sg Sekaloh *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89266.*

Tetrastigma cf. *diepenhorstii* (Miq.) Latiff
Woody climber *c.* 12 m long, *c.* 7 cm diam at base. Disturbed forest, by path, moderate shade. Tj Belipat, along boundary from Sg Niah (100 m from river) *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89202.*

VITTARIACEAE
**Antrophyum parvulum* Blume
Vegetation verification plot specimen near summit of Bukit Kasut.

Monogramma paradoxa Bedd.
Collected by H. Schneider (*pers. comm.*).

ZINGIBERACEAE
**Alpinia ligulata* K.Schum.
Clustering herb 2.5 m tall. Foot of limestone hill. Great Cave *Jemree Sablee et al. S 89061.*

Amomum borneense K.Schum.
Epiphytic herb. Locally abundant. MDF, light shade. Across river from Park HQ *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89441.*

**Boesenbergia* sp.
Creeping herb. At base of limestone rocks, medium shade, damp. Along Jalan Madu Trail *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89491.*
This species belongs to the *B. aurantiaca/belalongensis/ornata* group.

**Boesenbergia* sp. nov. (A. Poulsen, *pers. comm.*)
Yellow-flowered herb collected by A. Poulsen.

Globba atrosanguinea Teijsmann & Binnend.
Herb 60 cm tall. Disturbed forest, grey clay under 25 cm peat, moderate shade. Close to Sg Niah *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89258.*

**Globba ?propinqua*
Herb 50 cm tall. Limestone forest, medium shade, peaty soil at base of limestone rocks. Near Sg Subis. *Kit Pearce, Julaihi Abdullah & Serukit Dubod S 89452.*

Globba tricolor Ridley var. *gibbsiae* (Ridley) R.M.Smith
Solitary herb 40 cm tall. MDF, brown clay soil. Sekaloh *Jemree Sablee et al. S 89020.*

Zingiber cf. *albiflorum* (Ridley) R.M.Smith
Clustering herb 1.5 m tall. Disturbed peat swamp forest, moderate shade, peat soil. S of trail from Tj Belipat along N Park boundary. *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89230.*

Zingiber cf. *martinii* R.M.Smith
Erect, clustering herb 2.4 m tall. Disturbed, regenerating *emperan* forest, light shade, alluvial soil. Kuala Sg Subis *Kit Pearce, Yahud Wat, Serukit Dubod & Jeffri Johari S 89282.*

*Family unknown
Climber on tree. Limestone forest, sandy soil. Ulu Sg Trusan *Jemree Sablee et al. S 89059.*